



UNION OF SOUTH AFRICA

ANNUAL REPORT

OF THE

Department of Public Health

YEAR ENDED 30th JUNE, 1932

PUBLISHED BY AUTHORITY

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DEPARTMENT OF PUBLIC HEALTH.

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Department of Public Health.

REPORT FOR THE YEAR ENDED 30TH JUNE, 1932.

TO THE HONOURABLE THE MINISTER OF PUBLIC HEALTH,
PRETORIA.

I have the honour to submit the Report of the Department of Public Health for the year ended 30th June, 1932.

I.—INTRODUCTORY.

It is with great regret that the retirement of Dr. J. A. Mitchell from the combined post of Secretary for Public Health and Chief Health Officer as from the 8th April, 1932, as the result of ill-health has to be recorded. As was mentioned in the last Annual Report, his health broke down in 1930 at Bangkok while representing the Union Government at a meeting of the Leprosy Commission of the League of Nations Health Organization. In August, 1931, he resumed duty for a short time, but owing to continued ill-health found it necessary permanently to relinquish his office.

Dr. Mitchell came to South Africa in 1899 as Bacteriologist for Leprosy Research, Robben Island, for which post he was selected by the late Lord Lister acting on behalf of the Cape Government. Two years later he became Assistant Medical Officer of Health for Cape Colony. He was appointed Secretary for Public Health and Chief Health Officer for the Union in 1919. He was largely responsible for the establishment and organization of the public health and medical services of the four Provinces, and for the drafting of the legislation and regulations involved, including the Public Health Act of 1919, the Medical, Dental and Pharmacy Act of 1928, and the Food, Drugs and Disinfectants Act of 1929. As a colleague who has worked in close association with Dr. Mitchell over a period of some 29 years, I feel qualified to voice the very serious loss that the public health in South Africa has sustained by his premature retirement and to state that his work and high regard for duty will remain an inspiration to those who have to build on the foundations that he so well and truly laid.

The continued financial depression has rendered further restrictions in the activities of the Department necessary. It is not proposed to fill the vacancy in the professional staff caused by the retirement of Dr. Mitchell and the promotions consequent thereon. To carry out the more ambitious programme with regard to the combating of malaria in Natal, the Assistant Health Officer, Kingwilliamstown, has been transferred to Durban. This arrangement will allow of considerably more direct supervision of field work than occurred during the past. Unfortunately other duties kept the additional officer away from Natal during most of last summer, so that his services were not available for dealing with the serious epidemic of malaria that occurred.

The public health programme in South Africa was making slow but steady and reasonably satisfactory progress at any rate up to 1931. It has unquestionably been hindered by the fact that the full control of public health in the wider sense has not been placed in the hands of the Department. The Public Health Act, No. 36 of 1919, it must be remembered, was drafted largely in consultation with the Provincial Authorities and was framed in such a manner as to avoid hurting Provincial susceptibilities. The Department has certain powers and certain well defined duties under that Act, but the control of Hospitals, of the medical inspection of schools, of local authorities and of poor relief generally is entrusted entirely to the Provincial Administration. Some of these services have been consistently starved—though far less in the Transvaal than in the other Provinces—to enable money to be provided for other Provincial services which were considered to be of greater importance.

With the economic crisis a great cry has gone up for reduction in Governmental and local authority expenditure, and serious reductions have been made in health budgets in many instances where these already were far too small properly to safeguard the community. But the public generally is realizing as it has never done before that an expenditure on health is a good investment and I feel sure that ultimately our work will go forward in bad times as in good towards its goal, namely, the elimination as far as possible of preventable sickness and premature death. And perhaps the biggest factor in awaking the public to the fact that a wise expenditure on public health returns handsome dividends will be the fuller entry of South African women into public life.

II.—VITAL STATISTICS.

The following table summarizes the salient features of the vital statistics of the European population for each calendar year since 1920 :—

TABLE A.—UNION OF SOUTH AFRICA: SUMMARY OF VITAL STATISTICS OF EUROPEAN POPULATION, 1920–1931.

Calendar Year.	European Population (estimated).	Birth Rate per 1,000 of Population.	Death Rate per 1,000 of Population.		Death Rate per 100,000 of Population from				Percentage of Total Deaths, the Cause of which was Medically Certified.	Infantile Mortality Rate (Deaths of Infants under One Year per 1,000 Live Births Registered).	Maternal Mortality Rate (Deaths of Mothers in connection with Pregnancy or Childbirth per 1,000 Live Births Registered.)	Survival Rate or Rate of Natural Increase (Excess of Births over Deaths per 1,000 of Population).
			Actual or Crude.	Standardized.*	Diseases of Heart and Circulatory System.	Pneumonia and Bronchitis.	Cancer.	Tuberculosis (all forms).§				
1920.....	1,499,911	28.97	11.09	12.15	95.67†	113.87†	58.94†	46.00†	79.78	90.07	4.10†	17.88
1921.....	1,519,488†	28.44	10.41	11.43	102.91	136.15	69.09	58.26	80.76	77.09	4.94	18.03
1922.....	1,556,241	27.52	9.48	10.41	97.99	127.24	70.88	47.74	82.96	72.91	5.21	18.04
1923.....	1,579,733	26.70	9.77	10.65	108.50	120.72	78.94	46.46	82.77	74.42	5.22	16.93
1924.....	1,610,774	26.29	9.62	10.44	123.92	123.79	76.36	51.59	84.74	73.73	4.75	16.67
1925.....	1,637,472	26.51	9.39	10.15	128.86	97.04	72.86	52.70	86.45	68.39	5.62	17.12
1926.....	1,676,660†	26.16	9.59	10.28	127.21	113.44	71.18	53.41	87.76	64.82	4.56	16.57
1927.....	1,708,955	25.95	9.73	10.34	122.76	110.42	73.20	50.50	89.93	70.62	4.80	16.22
1928.....	1,738,937	25.77	10.15	10.69	133.53	127.72	77.52	50.95	89.93	70.49	4.98	15.62
1929.....	1,767,719	26.15	9.51	9.98	127.11	104.04	77.44	45.37	90.19	64.22	5.26	16.64
1930.....	1,797,900	26.44	9.69	10.08	132.33	112.87	82.62	46.76	91.15	66.84	5.26	16.75
1931.....	1,829,300	25.38	9.37		131.53	103.81	85.55	44.33	90.44	63.07	4.72	16.01

* The rate which would have obtained had the age and sex distribution of the population been the same as that of England and Wales at the 1901 census, the standard usually taken for international comparisons.
† Medically certified deaths only. Rates for subsequent years calculated on total deaths registered.
‡ Actual (per census).
§ Includes Miners' Phthisis combined with Pulmonary Tuberculosis.
|| Figures not yet available.

The birth rate, 25·38, shows a striking fall; it is the lowest yet recorded for the Union, and is 0·71 lower than the average for the previous five years. This is compensated to some extent by the death rate of 9·37, which also is the lowest yet recorded, being 0·36 lower than the average for the previous five years. Deaths from cancer show an increase over previous years, but the other causes of death all show an improvement. The infantile mortality rate of 63 is the lowest so far recorded—an improvement of 4 on the previous year and on the average of the last five years. The rate for maternal mortality also shows an improvement—0·54 over the previous year, and 0·27 over the average of the past five years. The infantile and maternal mortality rates are dealt with in more detail later.

The following information and comparisons in respect of Europeans with other countries, supplied by the Director of Census and Statistics, are of special interest:—

Population of the Union—Estimates as at 30th June, 1931:
European — 1,829,300; non-European: Bantu — 5,519,500; Asiatic—191,400; mixed and other coloured—592,400; total non-European—6,303,300. The European estimates are calculated on the average annual increases between the two last census, together with the annual records of births, deaths and migration. The non-European estimates are based on the 1921 census, and the average annual increase between 1911 and 1921.

Birth Rates.—Union of South Africa, 25·38; Portugal, 32·8; Greece, 30·9; Bulgaria, 30·6; Russia, 30·1; Lithuania, 27·4; Italy, 26·2; Canada, 24·5; Australia, 19·9; U.S.A., 18·9; New Zealand, 18·8; France, 18·1; Germany, 17·5; England and Wales, 16·3.

Death Rates.—Union of South Africa, 9·37; Australia, 8·6; New Zealand, 8·6; Germany, 11·1; England and Wales, 11·4; Belgium, 13·2; Italy, 13·8; France, 15·7; Lithuania, 15·9; Russia, 16·2; Portugal, 18·8.

Infantile Mortality Rates.—Union of South Africa, 63; New Zealand, 35; Australia, 47; Holland, 51; England and Wales, 60; France, 78; Germany, 84; Canada, 89; Belgium, 93; Italy, 125; Russia, 141; Portugal, 144; Lithuania, 154.

Survival Rate or Rate of Natural Increase.—Union of South Africa, 16·01; Portugal, 13·9; Russia, 13·9; Holland, 13·9; Canada, 13·5; Italy, 12·5; Australia, 11·3; New Zealand, 10·2; U.S.A., 7·0; Germany, 6·5; England and Wales 4·9; France, 2·4.

As regards non-Europeans, the available vital statistics of the Union are very incomplete. Notification of births and deaths is compulsory only in urban areas, and in many of these, owing to the large proportion of non-European male adults temporarily resident as labourers and to other circumstances, computations of death rates and similar statistics are useless or misleading.

It is greatly to be regretted that owing to lack of funds it was not possible even to enumerate the non-European population at the last census. The only reliable figures available for the non-European population are those of the decennial census enumerations, the last of which took place in 1921, when the figures were: Bantu, 4,697,813; Asiatic, 165,731; mixed and other coloured, 545,548; total, 5,409,092.

III.—ADMINISTRATIVE MATTERS.

1. *Staff.*—The accompanying chart shows the organization and functions of the Department and its principal personnel as at 30th June, 1932.

CHART OF DEPARTMENT OF PUBLIC HEALTH as at 30th June, 1932.

Minister of Public Health (HON. D. F. MALAN).			
Minister (Chairman.) Secretary and Chief Health Officer (Deputy Chairman). Mrs. S. B. Broers. Messrs. W. J. O'Brien, M.P., and L. C. Serrurier. Drs. C. Porter, K. Bremer, M.P., H. J. Steyn, and Sir Spencer Lister.	Council of Public Health— <i>Leprosy Advisory Committee</i>		
	Secretary and Chief Health Officer (Chairman). Sir Spencer Lister. Professors A. W. Falconer and O. K. Williamson. Drs. A. Pijper, F. C. Willmot, G. W. Robertson, A. J. Orenstein, K. Bremer, M.P., and G. A. Park Ross.		
Secretary and Chief Health Officer (Sir E. N. Thornton).†			
Head Office Establishment :			
1 Assistant Health Officer. (Dr. W. A. Murray).	1 Chief Clerk (A. de V. Brunt).	2 Principal Clerks (C. N. Millard and A. Stuart).	3 Senior Clerks, 29 Clerks, Typists, etc.
Sections.			

Assistant Health Officers (Detached).	Field Staff.	Pathological Laboratories.	Port Health Officers.	District Surgeons.	Housing.	Leprosy Institutions.	Veneral Diseases Hospitals.	Malaria.	Tuberculosis.	Epidemic and Infectious Diseases (Plague, Typhus, and Vaccination.	Food and Drugs Adulteration: Habit-forming Drugs.	Local Authorities.	Other Bodies.
Capetown: (Dr. F. C. Willmot) Durban: (Dr. G. A. Park Ross and Dr. L. Fourie) Johannesburg: (Dr. E. H. Cluver)	Two Assistant Health Officers: (Drs. A. J. van der Spuy and F. W. P. Cluver). Five Inspectors (4 plague and 1 typhus).	Capetown, and Vaccine Institute, Rosebank: (Dr. W. F. Rhodes; Dr. R. H. Mackintosh, assistant). Durban: (Dr. B. Sampson). *South African Institute for Medical Research, Johannesburg.	Capetown: (Dr. J. M. Bosman). Durban: (Dr. G. A. Batchelor). Port Elizabeth: (Dr. H. W. A. Kay). East London: (Dr. R. V. S. Stevenson). Simonstown: (Dr. A. B. Bull). Knysna: (Dr. T. B. Newman). Mossel Bay: (Dr. F. T. Waldron). Port St. Johns: (Dr. G. H. Meiring).	8 Whole-time. 3 Whole-time. (jointly). 312 Part-time. — Total. 323 —	Central Board—Sir E. N. Thornton (Chairman), Sir J. G. van Boeschoten, Messrs. F. W. Jameson, J. L. Hall, R. S. Gordon (Member & Secretary)	Pretoria: (Drs. J. W. de Vos, J. J. du Pre le Roux and H. J. F. Wood). Emjanyana: (J. A. MacDonald, and Dr. A. R. Davison). Mkambati: (H. C. Bellew and Dr. F. S. Drewe). Amatikulu: (F. J. Roach and Dr. G. D. Stoute). Bochem: (J. H. Franz and Dr. H. C. Franz).	Rietfontein, Johannesburg: (Dr. J. Daneel). Kingwilliamstown: *Bochem. *Elim. *Jane Furse Memorial. Several smaller hospitals.	Medical Inspector: (Dr. D. H. S. Annecke). Inspectors and Assistants.	Nelspoort Sanatorium: (Dr. P. Allan). *Holy Cross Medical Mission.	Field Staff. District Surgeons. Local Authorities. Magistrates, etc.	Inspectors, Customs, Police, etc. work done in chemical laboratories of Department of Agriculture at Capetown & Johannesburg.	224 Municipalities. 90 Village Management Boards. 39 Local Boards. 31 Village Councils. 43 Health Committees. 11 Local Administration and Health Boards. 94 Divisional Councils. 1 Health Board. 148 Magistrates. 5 Mining Commissioners. — Total. 686 —	South African Medical Council. South African Pharmacy Board. Rand Water Board.

* Receives Grant-in-Aid.

† Is also Director of Medical Services (Defence).

The principal changes during the year were:—

Sir E. N. Thornton, Senior Assistant Health Officer, appointed Secretary for Public Health and Chief Health Officer in succession to Dr. J. A. Mitchell, who has retired on pension on account of ill-health;

Dr. L. Fourie, Assistant Health Officer, Kingwilliamstown, transferred to Durban;

Dr. A. A. Louw, Additional District Surgeon, Durban, appointed District Surgeon, Capetown, to the post vacated by Dr. F. O. Fehrsen, who resigned from the service;

Dr. J. McKay, Assistant District Surgeon, Durban, appointed Additional District Surgeon, Durban, *vice* Dr. A. A. Louw;

Dr. J. H. Stals, appointed Assistant District Surgeon, Durban, *vice* Dr. J. McKay.

Proposals for the reorganization of the Headquarter staff of the Department were under consideration by the Public Service Commission during the year and the Commission's decision thereon is being awaited.

2. *District Surgeons*.—Only one new district surgeoncy was established during the year, at Warmbaths. Their distribution is shown in Table B.

TABLE B.—DISTRICT SURGEONCIES AND ADDITIONAL DISTRICT SURGEONCIES AS AT 30TH JUNE, 1932.

Province.	Whole-time.	Whole-time, but jointly with local authority or public body.	Part-time.			Total.
			On inclusive annual salary.		On annual salary with certain supplemen- tary fees and allowances.	
			District Surgeons.	Additional District Surgeons.		
Cape.....	3	3	1	7	138	152
Natal.....	3	—	—	1	39	43
Transvaal.....	2	—	7	8	53	70
Orange Free State..	—	—	—	11	47	58
UNION.....	8	3	8	27	277	323

The eight whole-time officers are those at Capetown, Durban (3), East London, Port Elizabeth, and Pretoria (2); the three whole-time officers appointed jointly with local authorities or public bodies are those at Grahamstown, Queenstown and Wynberg.

3. *Local Authorities and their Health Staffs*.—The numbers of the various classes of local authorities under the Public Health Act as at 30th June, 1932, are shown in Table C.

TABLE C.—LOCAL AUTHORITIES UNDER THE PUBLIC HEALTH ACT (1919), AS AT 30TH JUNE, 1932.

Province.	Municipalities.	Village Management Boards.	Local Boards.	Village Councils.	Health Committees.	Local Administration & Health Boards.	Magistrates.	Divisional Councils.	Board of Health.	Mining Commissioners.	Total.
Cape.....	128	83	22	—	—	—	29	94	1	1	358
Natal.....	9	—	17	—	10	11	44	—	—	—	91
Transvaal.....	26	—	—	31	33	—	40	—	—	3	133
Orange Free State	61	7	—	—	—	—	35	—	—	1	104
UNION.....	224	90	39	31	43	11	148	94	1	5	686

Whole-time Medical Officers of Health are employed by nine of these, namely, the Municipalities of Bloemfontein, Capetown, Durban, East London, Johannesburg, Pietermaritzburg, Port Elizabeth and Pretoria, and the Divisional Council of the Cape. The Kimberley Board of Health, jointly with the Kimberley Municipality, has a medical officer who devotes some of his time to laboratory work at the Kimberley Hospital, but does no private practice. At Grahamstown and Queenstown there are whole-time officers who carry out the combined duties of District Surgeon and Health Officer to the Municipal and Divisional Council.

On the 30th June, 1932, the local authorities employing certificated sanitary inspectors or/and health visitors devoting the whole of their time to sanitary work were 86 in number, namely, 39 in the Cape, 11 in Natal, 12 in the Orange Free State and 24 in the Transvaal. The total numbers of such persons are: Sanitary Inspectors, 232; Health Visitors, 16.

IV.—WORK OF THE DEPARTMENT.

1. *Inspections, Investigations and Field Work.*—The following is a summary of the activities of the medical officers of the Department during the year :—

Particulars	Sir E. N. Thornton.	F. C. Willmot.	G. A. Park Ross.	W. A. Murray.	E. H. Cluver.	A. J. van der Spuy.	L. Fourie.	W. F. Rhodes.	B. F. Sampson.	F. W. P. Cluver.	Total.
Systematic General Inspections of Local Authority Area...	—	—	1	1	7	—	29	—	—	17	55
Mines.....	—	—	—	—	103*	—	—	—	—	—	103
Factories and Works (including "Offensive Trade" premises)	—	1	10	—	5	—	—	—	1	1	18
General and Chronic Sick Hospitals under Provincial Administration.....	5	2	1	—	3	3	7	—	—	22	43
Mental Hospitals and Other Institutions under Department of Interior.....	—	1	2	—	—	—	—	—	—	—	3
Leprosy Institutions, Venereal Diseases Hospitals, Tuberculosis Sanatoria, etc.....	2	7	2	—	3	5	1	—	—	4	24
Prisons, Reformatories and other Institutions.....	21	3	—	—	2	1	—	1	1	—	29
Schools and Orphanages.....	—	—	—	—	2	—	—	—	—	2	5
Nursing and Maternity Homes and Private Hospitals.....	—	—	3	—	24	—	5	—	—	24	56
Water Supplies.....	—	3	1	1	4	—	—	1	2	4	15
Drainage and Sewerage.....	—	2	5	—	—	1	—	—	—	—	9
Housing (including Industrial Housing) and Overcrowding, Nuisances and Insanitary Conditions.....	3	3	4	—	4	—	3	—	—	2	19
Departmental Enquiries under Public Health or other Act..	—	—	—	—	4	—	1	—	—	—	5
Formidable Epidemic Diseases: Plague, Smallpox, Typhus, etc.....	—	8	2	—	2	—	2	—	1	—	15
Other Communicable or Preventable Diseases†.....	3	6	50	1	43	1	3	5	5	1	118
Other Inspections, Investigations and Field Work.....	—	18	1	2	4	6	2	1	2	2	38
TOTAL.....	34	54	82	5	210	17	53	8	13	79	555
Distances Travelled (approximate) in connection with Inspections, Investigations, etc —											
Rail.....	6,200	7,000	3,631	3,500	2,378	2,146	5,262	500	350	8,597	39,564
Road.....	1,800	3,000	5,737	400	5,487	263	6,941	—	800	882	25,310
TOTAL.....	8,000	10,000	9,368	3,900	7,865	2,409	12,203	500	1,150	9,479	64,874
Days Absent from Office in connection with Inspections, Investigations, etc.....	41	51	77	40	85	13	144	6	10	97	564

* Includes 40 compounds, 25 locations, 38 hospitals.
† During the year, Dr. D. H. S. Annecke carried out numerous inspections in connection with Malaria in the Transvaal. These are not included in the Table.

2. *Addresses, Published Papers and Special Investigations by Members of the Staff:—*

DR. G. A. PARK ROSS, *Assistant Health Officer—*

- “Malaria.” Address, Women’s Institute, Empangeni, 9th December, 1931.
- “Cool Clothes for Summer wear.” (Electricity Bulletin, Durban Corporation, March, 1932.)
- “Malaria.” Address, Medical Association of South Africa, 30th March, 1932.
- “Necessity for Alteration of Working Hours.” Debate, Natal Debating Society, Pietermaritzburg, 27th April, 1932.

DR. W. A. MURRAY, *Assistant Health Officer—*

- “Health Problems in Rural Areas.” Address, S.A. Red Cross Society, Johannesburg, 22nd February, 1932.
- “Municipal Sanitation in Small Towns.” Address, Health Officials’ Annual Congress, Johannesburg, 5th April, 1932.
- “The Problem of Human Tuberculosis in South Africa.” Mine Workers Union, Tuberculosis Congress, Brakpan, 11th May, 1932.

DR. E. H. CLUVER, *Assistant Health Officer—*

- “Heat Stroke Prevention in Deep Mines.” Proceedings of the Transvaal Mine Medical Officers’ Association, August, 1931. (Vol. XI, No. 123.)
- “Heat Injuries.” Paper read before the Northern Transvaal Branch of the Medical Association of S.A. on 13th October, 1931. Published in the Journal of the Medical Association of South Africa, 14th November, 1931.
- “An analysis of 92 Fatal Heat Stroke Cases on the Witwatersrand Gold Mines.” Paper read at the Fourth Annual Scientific Meeting of the Medical Association of South Africa, September, 1931. Published in the South African Medical Journal, 9th January, 1932.
- “Prevention of Disease in the Native Territories.” Address to American Board Mission, Johannesburg, 6th November, 1931.
- “Possibility of Spread of Formidable Epidemic Diseases by Aviation.” British Medical Journal, 17th October, 1931.
- “The Malaria Problem of the Union.” Paper read before the Eastern Transvaal Branch of the Medical Association of South Africa on 13th March, 1932.

DR. B. F. SAMPSON, *Government Pathologist—*

- “Malaria.” Address, Medical Association of South Africa, 30th March, 1932.
- “Blackwater Fever and its Relation to Malaria.” South African Medical Journal, 28th May, 1932.

3. *Health Publicity and Educative Work.*—The following pamphlets and leaflets have been prepared, published and distributed by the Department to date. Pamphlets or leaflets of which revised editions have been published are omitted from the list:—

- “Senecio Disease.” (Warning Notice.) No. 166 (Health).
- “Food and Health.” No. 194 (Health).
- “Directions for the Prevention and Treatment of Malaria.” No. 198 (Health).
- “Anthrax.” No. 239 (Health).
- “Venereal Diseases: Their Prevention and Treatment.” No. 248 (Health).
- “Instructions to Persons suffering from Gonorrhoea.” No. 249 (Health).
- “Instructions to Persons suffering from Syphilis.” No. 250 (Health).
- “Poisoning by ‘Stinkblaar’ or Thorn Apple (*Datura stramonium* and *Datura tatula*).” (Warning notice.) (No. 256 (Health).
- “Sleeping Sickness.” (Warning Notice.) No. 262 (Health).
- “Smallpox: Duties and Powers of Local Authorities under Public Health Act, and procedure to be followed in dealing with outbreaks.” No. 276 (Health).
- “Directions for the Performance of Public Vaccination.” No. 279 (Health).
- “Dagga Smoking and its Evils.” No. 289 (Health).
- “Plague: A Brief Account of its Symptoms, Clinical Diagnosis, Morbid Anatomy and Treatment.” (Drs. D. C. Rees and J. A. Mitchell.) No. 293 (Health).
- “Measures against Plague.” No. 306 (Health).
- “Plague: Its Control, Eradication and Prevention.” No. 316 (Health).
- “Plague and its Cause and Prevention.” No. 317 (Health).

- “ Rodents: Description, Habits, and Methods of Destruction.” (W. Powell.) No. 321 (Health).
- “ Fly-proof Latrines for Coloured Persons.” (Dr. G. A. Park Ross.) (No. 334 (Health).
- “ Houseflies: Their Life-history, Destruction, and Prevention, and their Influence on Sanitation and Health.” No. 335 (Health).
- “ Bilharzia (Human Redwater) Disease.” No. 339 (Health).
- “ Snake-bite and its Treatment.” No. 348 (Health).
- “ First Measures in Malarial Prevention for Farmers and Settlers,” together with illustrated wall-poster: “ Danger of Mosquitoes.” (Drs. G. G. Hay and G. A. Park Ross.) Published jointly with the South African Red Cross Society (Transvaal). No. 356 (Health).
- “ Instructions to Native Patients suffering from Syphilis or Gonorrhoea.” (In Zulu, Sixosa, Sesuto, and Sechuana.) (No. 358 (Health).
- “ Malaria Catechism.” No. 360 (Health).
- “ Influenza.” No. 363 (Health).
- “ Typhoid or Enteric Fever: Its Causes, Spread and Prevention in South Africa.” No. 365 (Health).
- “ Care of the Teeth and Prevention of Dental Disease in Children.” No. 368 (Health).
- “ Leprosy in the Transkei.” No. 372 (Health).
- “ Catechism about Typhoid or Enteric Fever.” No. 378 (Health).
- “ The Teeth: How to Prevent Decay.” No. 379 (Health).
- “ Plague Danger in Cape and South-Western Districts: Measures and Procedure in Event of Outbreak.” No. 380 (Health).
- “ The Cause and Prevention of Simple Goitre.” No. 394 (Health).
- “ Typhus or Louse Fever.” No. 417 (Health).
- “ Consumption, its Causes, Prevention and Treatment.” No. 439 (Health).
- “ The Control of Malaria by Larvicidal Methods.” No. 435 (Health).

The following cinema films have been purchased by the Department and are available to local authorities and public bodies for exhibition purposes:—

- “ The Rat Menace.”
- “ Swat that Fly.”
- “ Fly Danger.”
- “ Your Mouth.”
- “ The Story of John McNeil ” (tuberculosis).
- “ The War on the Mosquito.”
- “ How to Live Long and Well.”
- “ One Scar or Many ” (vaccination).
- “ In His Father’s Footsteps ” (insanitary farm-typhoid).
- “ The Long *versus* the Short Haul ” (dirty milk).
- “ Bringing it Home ” (child welfare).
- “ Bilharziasis.”
- “ Malaria ” (in Hollands).

A set of small models, specially made for the Department by a health inspector who is also a clever handyman, is stocked by the Department’s health officers at Pretoria, Capetown, and Durban for loan to local authorities and other bodies for demonstrations during “ health weeks ” and on similar occasions, and for illustrating lectures on hygiene. Each set includes a model for illustrating—

- (1) methods of rodent-proofing buildings;
- (2) an “ open-air ” room for home segregation of a tubercular patient;
- (3) Baber’s maggot-traps;
- (4) Russell’s modified maggot-trap;
- (5) Russell’s modified box fly-trap;
- (6) Squatting closet for native use.

The Department has purchased an up-to-date epidiascope with portable electric generator for its propagandist campaign—also three magic-lanterns. Lantern slides are now on order. It is hoped to increase educative work in connection with campaigns against malaria, plague, bilharzia, and fly-borne disease and general insanitation, so as to ensure the co-operation of an enlightened public.

4. *Laboratories.*—The work done by the Government Laboratories at Capetown and Durban and that carried out at the cost of the Government at the South African Institute for Medical Research, Johannesburg, and at Port Elizabeth is shown in Table “ E ”.

TABLE E.—PATHOLOGICAL LABORATORIES: ANALYSES AND EXAMINATIONS,
YEAR ENDED 30TH JUNE, 1932.

Particulars.	Laboratories.		South African Institute for Medical Research.	
	Capetown.	Durban.	Jo- hannesburg.	Port Elizabeth Branch.
<i>Specimens Examined for—</i>				
Government Departments—				
Agriculture.....	15	3	—	—
Customs and Excise.....	118	—	16	—
Defence.....	528	8	1,952	—
Interior (Mental Hospitals, etc.).....	308	604	334	56
Justice.....	607	150	1,402	1
Justice (Prisons).....	—	318	454	—
Mines and Industries (including Miners' Phthisis).....	—	—	10,836	—
Posts and Telegraphs.....	39	—	—	—
Public Health (including Leper Insti- tutions).....	9,563	11,458	28,693	4,685
Public Works.....	—	2	—	—
South African Railways and Harbours	116	810	—	—
Other Government Work.....	154	131	726	123
General Hospitals (Provincial).....	2,026	4,846	29,447	3,595
Local Authorities.....	18,185	2,998	3,487	3,499
Medical Practitioners.....	9,643	14,912	12,251	1,340
Department of Education (Provincial)..	—	—	—	—
Other Governments or Administrations.	—	—	75	—
Others.....	—	557	311	27
TOTAL.....	41,302	36,797	89,984	13,326
<i>Manufactures and Issues—</i>				
Autogenous Vaccines.....e.e.	550	1,350	31,575	6,200
Bacterial Vaccines (stock).....e.e.	—	—	307,037	Included in Johannes- burg figures.
Tuberculin Dilutions.....e.e.	—	—	742	
Sera (various).....e.e.	—	—	431,340	
Anti-rabies Vaccine.....e.e.	24,000	—	—	
Bulgarian Milk Cultures.....bottles	—	—	89	—
Insulin.....tubes.	—	—	—	—
Chaulmoogra Oil Preparations.....e.e.	33,725	—	—	—
Smallpox Vaccine—Calf Lymph (prepared at Vaccine Institute, Rosebank)..tubes	772,000	—	—	—
Attendances at Courts of Justice by Members of Staff.....	110	36	5	1
Total Days' Absence entailed by such attendances.....	100	36	19	1

5. *Port Health Administration.*—The following table summarizes health work at the ports of the Union during the year:—

TABLE F.—PORTS OF THE UNION: HEALTH MEASURES DURING THE YEAR ENDED 30TH JUNE, 1932.

Particulars.	Capetown.	Durban.	Port Elizabeth.	East London.	Mossel Bay.	Knysna.	Port St. Johns.	Simonstown.	Port Nolloth.	Total.
Vessels dealt with.....	886	1,160	734	571	318	20	13	65	45	3,812
Cases of infectious or communicable diseases dealt with.....	211	253	1	—	—	—	—	—	—	465
No. of Vessels involved.....	69	66	1	—	—	—	—	—	—	136
Disinfections—										
Vessels.....	15	3	—	—	—	—	—	—	—	18
Consignments second-hand clothing and other articles.....	23	62*	35	—	—	—	—	—	—	120
Bales of mixed articles.....	—	—	25	—	—	—	—	—	—	25
Deratizations under International Sanitary Convention—										
No. of Vessels Deratized and Certificates Issued	—	56	—	—	—	—	—	—	—	56
No. of Exemption Certificates Issued.....	15	30	—	—	—	—	—	—	—	45
Rats Destroyed on Vessels and on Shore.....	2,437	2,756	2,366	574	317	—	—	—	—	8,450

* In addition, the personal effects of 1,416 Indian and Coloured passengers were disinfected.

No ships arrived at any of the Union ports with cases of smallpox. The M.V. "Forafric" disembarked one case of smallpox at Colombo on her voyage from the East during March. No further cases occurred during the voyage south and on arrival in Durban, 21 days later, the ship was given full pratique.

Several Japanese emigrant ships bound for South America were placed under restricted pratique, both at Durban and at Capetown, owing to outbreaks of measles and chicken-pox. All had large numbers of children on board, and it was among them that the outbreaks chiefly occurred. No children from these ships were allowed to land. The possibility of the occurrence of smallpox infection among these emigrants was carefully investigated; in all cases they were found to have well-defined vaccination marks.

Venereal disease was found fairly prevalent on board ships. When on examination special treatment was considered essential, such cases were removed to an infectious diseases hospital for medical attention at the vessel's expense.

The stringent precautions at all of the ports for preventing rats coming ashore from ships has been continued. The regular and systematic inspection and deratization of ships, as laid down in Article 18 of the International Sanitary Convention, has now become world-wide. The success of the methods adopted is illustrated by the comparative rarity of vessels arriving at our ports badly rat-infested. Ships whose certificates of deratization have expired on arrival at Durban or Capetown are fumigated if any evidence of rodent infestation is discovered. After such fumigation an International deratization certificate is issued. All coastwise vessels are periodically examined and any infestation discovered is at once eliminated by the use of cages or poison, which several of the coasters carry as part of their equipment.

6. *Health Supervision of Air-craft.*—It was pointed out in the last Annual Report how the increasing risk of introduction into the Union of formidable epidemic diseases by air-craft had been met. As the result of representations, *inter alia*, from the Union Government the Draft of the proposed International Convention for the Sanitary Control of air-craft was amended in such a way as should enable the States in Southern Africa to subscribe to it. As amended it allows for a period of quarantine or detention of passengers if considered necessary in the country of arrival.

The International Health Office of Paris has now completed the final text of the agreement. It provides mainly for the provision of a few simple and practical measures in yellow fever infected countries. These include the placing of aerodromes intended for international traffic in suitable situations, keeping them and their personnel free from yellow fever infection, the ridding of air-craft of all mosquitoes before leaving, and a medical inspection and enquiry of passengers. The necessity for an uninfected country such as the Union having actually to refuse to admit air-craft from an infected country ought not to arise if the scheme of the Convention is reasonably followed.

As foreshadowed in last Annual Report the Health Secretariat of the League of Nations has now arranged for a Health conference to be held in Capetown next November. The League has already sent invitations to the following countries to send representatives to the conference: Southern Rhodesia, Northern Rhodesia, Portuguese East Africa, Belgian Congo, French Equatorial Africa, Uganda, Nigeria and British India. The Union Government has suggested that the following additional countries be invited to send representatives: Kenya, Tanganyika, Zanzibar, Nyasaland, Basutoland and Bechuanaland Protectorates, Angola, French West Africa, and Gold Coast. The countries mentioned will then cover all the likely exporters and importers of yellow fever and the practical difficulties in applying the provisions of the draft Convention can be thoroughly discussed. The League of Nations will be represented by Sir George Buchanan, with Dr. Park, Director of the Singapore Bureau as Technical Secretary. The League will also send an expert on the Pathology and Epidemiology of yellow fever. The Delegates will be the guests of the Union Government while attending the Conference. The Agenda will very largely be occupied by the problem of yellow fever and the steps necessary, in view of the development of aerial transport, to prevent its spread; other public health problems of interstate importance such as plague and the adoption of uniform regulations to prevent the spread of smallpox from India will also be considered.

7. *Adulteration or False Description of Food, Drugs and other Articles.*—The Food, Drugs and Disinfectants Act, No. 13 of 1929, and the

regulations thereunder, came into force on the 1st April, 1930. The following table shows the samples taken for examination or analysis under that Act during the year, and the results:—

TABLE G.—SAMPLES TAKEN FOR EXAMINATION OR ANALYSIS UNDER ACT NO. 13 OF 1929 DURING YEAR ENDED 30TH JUNE, 1932, AND THE RESULTS.

Place.	Total Taken.	No. Analysed or Examined.	No. found Adulterated or Incorrectly or Falsely Described.	Prosecutions.	Convictions.	Remarks.
Ports of Union.....	305	269	16	—	—	41 consignments detained pending relabelling. 8 consignments reshipped or destroyed.
Cape Province.....	1,670	1,643	621	86	73	
Natal Province.....	407	407	46	25	25	
Transvaal Province..	1,006	1,001	63	42	35	
Orange Free State Province.....	159	159	9	9	8	
TOTALS.....	3,547	3,479	755	162	141	

Imported Articles dealt with at Ports of the Union (including Inland Customs' Ports of Entry).—This work is carried out by this Department with the co-operation and assistance of the Department of Customs and Excise. The total of 269 samples shown in the foregoing statement as analyzed or examined included a large variety of articles of which 16 were found on analysis to be below the standards laid down, 41 consignments were detained and the agents or importers called upon to re-label the articles in conformity with the requirements of the Act or the Regulations, and 8 consignments which were refused admittance were either destroyed or re-shipped in terms of Section 11 (4) of the Act. Warning notices were issued in respect of 198 samples found to be below standard or not correctly labelled.

Articles falling within the scope of the Act which are imported into the Union from foreign countries have in several instances been found to bear labels printed only in the language of the exporting country, and as a measure of protection to the consumer, by enabling him from an examination of the label to ascertain the nature and contents of the article he is purchasing and in certain circumstances the names and proportions of the ingredients used in the manufacture or preparation of the article, it was decided to insist on the labels of all future importations of such articles being printed in one or other of the official languages of the Union except as regards information which in terms of the Regulations is required to be printed in both official languages; the matter has been brought to the notice of importers and others concerned by means of a notice published in the *Gazette*.

Perishable articles, flour, meal, and bread (whether sold in sealed packages or not)—also other articles of food not packed or sold in sealed packages.—Where the Minister has delegated powers under Section 2 (3) of the Act, enforcement is carried out by the Local Authority; elsewhere it falls to be dealt with by this Department. During the period under review a total of 1,481 samples (including 1,319 milks) were purchased by and analyzed on behalf of the 24 Local Authorities to which the necessary powers have been delegated; 156 samples were found to be adulterated and prosecutions were instituted in 106 instances. The arrangement in force entitles each such Local Authority to the examination or analysis, free of charge in a Government laboratory, of a number of samples annually, calculated on the basis of four samples per thousand of the European population at the last Census. In the other areas where, with the co-operation of the Police, sampling is undertaken by this Department, a total of 1,761 articles (including 1,316 milks) were procured for analysis, of which 573 were found to be adulterated or not up to standard, and prosecutions were instituted in 56 instances and a number of warnings issued.

With regard to milk adulteration, Section 17 (3) of the Act creates four offences and the accused person may be indicted for selling milk (a) to which water has been added, or (b) from which fat has been abstracted, or (c) which

contains less than 3 per cent. fat, or (d) which contains less than 8·5 per cent. solids-not-fat. Hitherto it has been considered advisable to indict merely for selling milk below the legal standard and the Analyst's certificate has been worded accordingly. It has transpired, however, that in several prosecutions very small fines have been inflicted, and there is the feeling that Magistrates might be disposed to take a more serious view of the offence if it could be definitely certified by the Analyst that water had been added or fat abstracted. The matter is complicated by the fact that the Analyst is not invariably in a position to state that a low percentage of fat or of solids-not-fat in a sample is due to fat abstraction or added water, and evidence could be brought to show that cases do occur in which milk direct from the cow returns low percentages of fat and non-fatty solids although in such instances the duty devolves upon the dairyman to improve his herd so as to ensure that the milk produced is up to legal standard. It has accordingly been arranged to give a trial to the suggestion that in any instance in which the Analyst can, by means of additional tests, come to the conclusion that there has been watering or skimming he should so amplify his certificate. The charge would then be one of selling milk to which water has been added or from which fat has been abstracted (as the case may be), or, alternatively, of selling milk below the legal standard.

Formerly practically all flour imported into the Union was subjected to artificial bleaching. A departmental Committee in the United Kingdom in 1923 reported that they were not prepared on the information available to recommend the complete elimination of flour bleaching. Since the date of the report further information has become available and when the Food and Drugs Act was passed in South Africa and the regulations framed thereunder were drafted it was decided to prohibit the importation and sale of any flour that had been subjected to any artificial bleaching process. The reason for this was that it has been found that at least one-third or more of the yellow colouring matter of flour identified as carotene or a closely allied body is destroyed in the processes of commercial bleaching. It has been found that carotene is the precursor of vitamin A in the body. Although it is not identical with vitamin A and contains none of this accessory factor it is a "vitaminogen" in that when ingested it leads to the production of vitamin A in the liver. Vitamin A is of course primarily a protective agent against bacterial infection.

Articles Manufactured in the Union and Packed or Sold in Sealed Packages.—All such articles are dealt with by this Department, with such assistance as the Local Authority may render, and include the articles to which certain provisions of the Act were applied in terms of Government Notice No. 574 of 1930, namely, any ointment, cream, powder or similar substance for application to or use for the human skin or hair, soap, tobacco, cigars, cigarettes, snuff, and chewing-gum. The work of label inspection and correction continued to occupy much of the time of inspectors, who during a number of arranged tours took the opportunity of re-visiting centres and following up the action taken by manufactures and others as an outcome of warnings previously issued regarding irregularities in labelling. For the purpose of ascertaining whether the contents of packages were in accordance with the labels 309 samples were purchased and prosecutions instituted in 6 cases including 3 confectionery, 1 soap, 1 tomato sauce, and 1 tinned peas.

A good deal of attention was directed during the year by Inspectors to fruit juices, fruit syrups, and similar non-alcoholic beverages, as also to aerated and mineral waters for which during the summer months there is a not inconsiderable demand especially by children, and this has led to a very noticeable improvement in the labelling of these products, particularly as to whether any synthetic ingredients have been used in their manufacture and any preservative added, which facts must be disclosed on the label. The action taken involved numerous visits of inspection to cafés and bioscopes where soda water fountains are installed and which must be labelled in the manner applicable to bulk stock as laid down in the regulations.

The numerous bazaars which during recent years have become so noticeable a feature in the larger centres and do a large cash trade in the sale of articles contained in sealed packages have also come under the special notice of Inspectors when on their rounds of inspection. As bearing on this aspect of the work it is appropriate to refer here to the very useful provisions of Section 10 of the Act which empower, in the case of any food or drug sold by a retail dealer in a sealed original package and found not to be in accordance with the Act, the taking of action simultaneously and on the same sample against both the retailer and the person who appears from the label of the sample to have manufactured or imported such article or to have enclosed it in such package, and in one instance of proceedings so instituted the manufacturer was convicted and a heavy penalty imposed. The procedure

under the section quoted should prove a very effective weapon against the unscrupulous manufacturer who disposes of adulterated or falsely described goods in the smaller town or country dorp where he considers there is less chance of detection, as it avoids the necessity of having to purchase a separate and fresh sample direct from the manufacturer who would probably then become suspicious and be on his guard.

Drugs.—Thirty-seven samples of drugs were purchased and nine were found to be adulterated or not up to standard. The numerous widely advertised quack remedies claiming grossly exaggerated medicinal and curative properties and the feasibility of taking action in regard thereto as constituting an infringement of Section 4 (1) (i) of the Act read in conjunction with Section 6 are matters to which the Department is giving careful and serious consideration. In this connection mention is to be made of a recent case in America in which a consignment of a certain preparation was condemned and ordered to be destroyed on the grounds that the statements made on the bottles and in the circulars as to the curative and therapeutic effects of the article were false and fraudulent and that the article contained no ingredient or ingredients capable of producing the effects claimed.

Disinfectants.—All disinfectants are examined by the Government Pathologist in the Department's pathological laboratory at Capetown, 90 samples having been taken during the year from consignments detained at the ports; 72 warning notices were issued during the year in respect of disinfectants found to be incorrectly labelled. In scrutinizing disinfectant labels regard has also to be had to the labelling requirements of the Medical, Dental and Pharmacy Act, No. 13 of 1928, in respect of poisons. Hitherto action has been concentrated mainly on the imported disinfectant through the submission for examination of samples taken by the Customs from consignments detained at the ports, but cognisance is now also being taken of the locally manufactured product, certain brands of which it is known are unsatisfactorily labelled and are being sold without any attempt to comply with the regulations.

General Warranties.—Two applications for the registration of general warranties in terms of Section 28 of the Act were granted during the year, one being in respect of a Coffee and Chicory Essence and the other a Mixed Coffee. The total number of general warranties registered and in force is now 23.

General.—All analytical work under the Act, with the exception of that performed in the municipal laboratories at Pretoria and Durban, has been carried out in the Government Chemical Laboratories at Capetown and Johannesburg both of which are administered by the Department of Agriculture. The activities of this Department and the Local Authorities to whom powers have been delegated under Section 2 (3) of the Act in the taking and submission of samples for analysis were restricted during the greater portion of the year under review owing to the staff position at the Johannesburg Laboratory. The position improved during the latter period of the year and notification was received that the staff had been brought up to its full numerical strength. There was, however, a considerable pressure of work in the Laboratory in more than one direction and after consulting the Chief of the Division of Chemistry in the Department of Agriculture this Department was enabled to advise the Local Authorities served by this Laboratory that samples other than milks could be submitted for analysis. The Local Authorities were requested when taking samples to make a judicious selection and restrict such samples to essential foods or to such articles where there were good grounds or reasons to suspect that they were adulterated or not in accordance with the requirements of the Act or the Regulations, and not to take samples at random.

The arrangements whereby certain of the larger Local Authorities have undertaken the administration and enforcement of the provisions of the Act as regards perishable and certain other articles have worked smoothly and advantageously to all concerned. Whilst 24 of such Local Authorities are assisting in the endeavour to ensure the supply of pure and wholesome foodstuffs to the consuming public it is a matter of regret and disappointment that a large Local Authority like Capetown has hitherto refused to accept or take any responsibility or part in the work. It is understood, however, that the Health Committee of the City Council is now in favour of a proposal by the Medical Officer of Health suggesting that the Council should take over the administration, so far as food articles are concerned, of the Act.

The enforcement of the Act has been pursued with greater vigilance and the Department continued to receive a great deal of co-operation from

manufacturers who have for the most part taken the necessary steps to comply with the labelling and other regulations. Most of the trades concerned have loyally accepted the altered conditions of manufacture and labelling required under the Act. In all trades there must necessarily be a certain number of persons who are unscrupulous or evasive and a number of such persons have either been warned in writing or prosecuted.

8. *Unsound Foodstuffs*.—Unsound foodstuffs and food unfit for human consumption fall within the provisions of Section 113 of the Public Health Act No. 36 of 1919, as amended by Section 13 of the Public Health (Amendment) Act, No. 15 of 1928. It is the duty of a Local Authority to deal with any such articles within the area of its jurisdiction and it is empowered by Section 148 of the principal Act to institute proceedings against persons contravening the Act. Difficulties have been experienced in the past in instituting proceedings for contraventions of Section 113 against persons selling tinned foodstuffs, the containers of which were found to be blown, without first having to submit the article to a long and costly bacteriological examination to prove the presence of pathogenic organisms. In order to overcome this a regulation was made under Section 115 of the Act and promulgated under Government Notice No. 392 of 24th March, 1932, prohibiting the sale or exposure for sale of any meat or fish or meat or fish preparations packed in an hermetically sealed tin or other air-tight receptacle if the tin or receptacle is blown in any degree, extensively rusted or damaged so that it leaks or otherwise becomes unsealed. During the year 223 tins of foodstuffs, mostly fish, which were exposed for sale in country stores were seized by inspectors of this Department, the containers of which were blown and the contents unfit for consumption. Proceedings were instituted against 10 persons in respect of these tins; 8 persons were convicted and two were discharged on technicalities. 42 Tins of fish were destroyed with the consent of the owners.

Imported articles are dealt with by this Department. No. 28 of the Port Health Regulations empowers a port health officer to inspect, examine, detain, seize, or remove for the purpose of examination any article of food or drink, whether intended for man or animals, on board any vessel or within any port or harbour area or in any bonded store or other premises under the control of the Commissioner of Customs, if he is of the opinion that it is diseased or unsound or unwholesome or otherwise unfit for consumption. During the year 9 consignments consisting of 31 bags, 6 barrels, and 333 cases containing a varied assortment of foodstuffs were found by port health officers to be unwholesome or unfit for consumption and ordered to be destroyed. The value of these articles, so far as could be ascertained amounted to £201. 18s. 10d.

9. *Health of Natives on Mines*.—Supervision of health conditions on the mines was continued. Systematic inspections of hospitals, compounds and locations were again carried out. Enquiries into mining hygiene problems were, however, considerably interrupted by the fact that, owing to shortage of staff, Dr. E. H. Cluver had to be seconded for prolonged periods on other duties in various parts of the Union.

Valuable alterations to the regulations governing compounds in the Transvaal were made during the year as the result of representations from the Department. The hygienic danger of large compound rooms in which sixty or more natives sleep in no wise separated from each other has been repeatedly pointed out. The necessity for smaller rooms with bunks in which the boys are separated by partitions to lessen the risk of spread of disease by infected droplets of saliva has been urged. It is difficult to prove the hygienic advantage of smaller rooms statistically on the gold mines. Representatives of the industry pointed to the fact that mortality rates were not obviously higher among boys sleeping in large rooms than those in small rooms. Death rates are, however, a very imperfect indication of hygienic conditions when one is dealing with very carefully selected individuals recruited at the most robust period of their lives. Further in a hazardous employment such as gold mining there are so many factors influencing mortality rates that to deduce the influence of one factor, such as that of housing conditions from a crude statement of the death-rate is impossible. Morbidity rates, for the same reason, are of little value. The causative factors are too many to estimate accurately the effect of any one of them. On the other hand hygienic experience in general has clearly established the advantage of smaller rooms; although the administrative and economic advantages of the large rooms and their long existence with apparent impunity render mine management loth to relinquish them. The Department's attitude in this matter is supported by the Tuberculosis Research Committee whose report has now been published. They state: "There is unanimity amongst the members of the Tuberculosis

Research Committee that many of the compounds are unsatisfactory; that the accommodation of 40 or more men in the same room for sleeping and eating, with about 200 cubic feet of air space per person, involves risks of overcrowding and the distribution of air-borne infections." According to the new regulations no living rooms in future will be approved to accommodate more than twenty natives; bunks must be so constructed as to prevent the harbourage of vermin and they must be separated by partitions not less than 16 inches high extending to within six inches of the end of the bunk.

The office in Johannesburg works in close association with that of the Director of Native Labour regarding matters of native housing, feeding, and hospital accommodation. Recommendations made by the Assistant Health Officer are followed up by inspecting officers of the Native Affairs Department. Mine managements on the Witwatersrand in general continue to co-operate readily with the result that such improvements as are from time to time found necessary are effected without friction.

A similar arrangement has now been come to with the Director of Native Affairs regarding collieries. Those of the Witbank area and in Natal were inspected by Dr. Cluver during the year. In Witbank very considerable improvements in housing and hospitalization have been effected as the result of representations made by the Department. In Natal these matters are still far from satisfactory and in many cases housing of the employees is exceedingly primitive and not free from grave hygienic dangers. Owing to the depressed state of the coal mining industry it is not practicable to press for the extensive structural alterations that are desirable. Nevertheless managements were eager to carry out improvements that were practicable without great expense and some of the worse features are being remedied.

The entire absence on most collieries of any official with technical training in mine hygiene has been stressed at various times. The matter was discussed by the Director of Native Labour and the Assistant Health Officer with a deputation from the Collieries Committee of the Transvaal Chamber of Mines in December. It was represented by the deputation that most of the collieries were at present not large enough to warrant the appointment of a hygiene officer as an additional European official, and that a very large part of the compound manager's work consisted of health supervision of the kind intended for the hygiene officer. They readily agreed that a knowledge of hygiene was necessary for whatever official was in charge of such matters. After discussion it was agreed that a course of training in hygiene should be arranged for in Witbank with an examination thereafter which should be attended by all compound managers and in some cases other mine officials as well. A thorough and comprehensive course of this nature was commenced in March by Dr. F. J. Allen at the Technical Institute, Witbank, and certificates were granted to successful candidates.

A further difficulty regarding adequate hygienic control of collieries has also been removed. Hitherto the Mine Medical Officer was not in charge of such supervision. It has now been arranged that the medical officer at each colliery is in charge not only of the hospital but also of the general hygienic supervision of the mine. It is hoped that this will have the effect of stimulating on the part of the medical officers greater interest in the prevention of disease among the native employees, instead of as had been the case on some collieries a definite discouragement by managements of any activities in this direction.

Heat Stroke.—During the year under review 18 deaths of natives from heat stroke occurred in the deep levels of mines on the Central and East Rand. Seven mines were involved. During the previous year there were 21 deaths and in the year before that 27. The fall in the number of fatal cases of heat injuries though at first sight small is yet very encouraging when it is realized that continually greater depths with corresponding increase of rock temperatures are being reached in the mines concerned. The number of non-fatal heat injuries that have occurred cannot be accurately stated as they are not reported unless the individual becomes unconscious. There is, however, reason to suppose that the incidence during the present year is very considerably less than during the two previous years.

It was the very high incidence during the summer of 1929-30 when 27 deaths occurred that caused serious notice to be taken of this new hazard in gold mining. The steps taken to combat it consisted essentially in improving the ventilation and thereby the cooling power of the atmosphere in the deep level working places, and in requiring new boys to serve an acclimatization period in cooler working places before drafting them to the hot places. Useful experience in the methods of acclimatization is being gained. The condition of the boys prior to going on shift is also receiving attention,

Certain of the mines now provide those going to deep levels not only with a meal in the compound before going on shift, but also with salty food to be eaten during the shift.

The heat stroke deaths that occurred during the year again indicate the importance of acclimatization. Of the 18 boys 12 collapsed on their first or second day underground, 1 collapsed on his first day in the hot stope after having served a period of probation in a cooler working place. Only 5 of the boys had been working in a hot place for more than two shifts. With one exception all the boys had been engaged on the strenuous work of lashing; the other boy was sweeping. Seventeen of them were working in stopes, the other in the haulage. The wet-bulb temperatures in these places averaged 87° F., the dry thermometric temperature being a fraction of a degree higher. The tribal distribution of the boys was: Basutos, 6; Xosas, 3; Baca, 1; Pondo, 1; Pokwani, 1; Zulu, 1; Bechuana, 2; Shangaan, 2 and Nyambaan, 1. The relatively large number of boys from the cold Basutoland climate in proportion to the small numbers recruited from there is again evident.

Scurvy.—This condition which is directly due to a dietetic deficiency continues to occur among the natives employed on the gold mines though to a very much smaller extent than was the case previous to the introduction of anti-scorbutic measures. According to the monthly returns from the mines 380 patients were admitted to hospitals for this condition. In addition to these in which scurvy was the primary condition there were numerous others in which milder scorbutic manifestations occurred in patients admitted for other causes.

This continued occurrence of scurvy serves as a reminder of the special hazard of a community which subsists normally on a very restricted diet. The mealie-meal porridge which forms the bulk of the dietary is virtually devoid of anti-scorbutics. These are provided in the fresh vegetables, germinated beans and meat. But very careful supervision is necessary to secure their adequate utilization. Their value may be lost by careless cooking; a certain proportion of the natives will deliberately discard the vegetables if this is at all possible. The danger of overcooking has been driven well home and it is now probably exceptional in compounds of the Witwatersrand for the vegetables to be exposed to boiling for more than thirty minutes. But the boys who object to vegetables still persist in picking the pieces out of the stew with their fingers. This is now being combated very successfully on many mines by the introduction of automatic vegetable cutting and mincing apparatus. By means of this the vegetables are reduced to a fine pulp which can be stirred into the stew just before the steam which heats the pots is turned off. Even this does not avail in the case of certain very conservative natives who merely take the meat out of their stew ration and discard the rest.

It will be evident why scurvy tends to occur chiefly among very recent recruits on the one hand and boys of long service on the other. New boys from the territories often arrive on the mines in an under-nourished, sub-scorbutic state which is readily converted into florid scurvy by hard work. The long-service boy who has attained to a certain feeling of independence deliberately discards the anti-scorbutic vegetables and germinated beans specially provided.

The amount of scurvy which occurs is not of very great significance. What is of importance is the fact that the continued presence of florid scurvy to even this small extent suggests the very much greater prevalence of latent scurvy among the mine employees. Such natives are not receiving the physiologically necessary supply of vitamin, and are correspondingly more susceptible to infective conditions such as pneumonia and phthisis. Only by continuous and very careful supervision can these dangers be eliminated.

Yaws (Framboesia Tropica).—A very serious prevalence of this highly contagious condition came to light at one of the Johannesburg mines. The cases were at first sent to the venereal diseases hospital, Rietfontein, for treatment, but later the mine made its own arrangements locally for isolation and treatment. The disease had occasionally been recognized on other mines. In view of its unexpected prevalence on this one mine the possibility of its occurrence on other mines and confusion with syphilis had to be investigated. Careful instructions were therefore issued to ensure the condition being recognized and adequate preventive measures being taken where it occurred. No other serious prevalence has, however, been revealed on any of the mines.

2. *Bilharziasis (Schistosomiasis)*.—Treatment camps were again arranged by the Transvaal Bilharzia Committee, one at Sandrift near Brits and another at Alma in the Waterberg District.

At Sandrift the total number of children receiving the full course was 69, including 5 girls. Both Fouadin and sodium antimony tartrate were again used. The Fouadin on the whole gave quicker results. It was found easy to administer, and complications do not tend to occur. The objection to its general use is one of expense; the cost of each course of Fouadin to cure one patient is equal to that of treating completely about 50 by means of sodium antimony tartrate. None of the cases treated at this camp was very heavily infected. The infection had mostly been of about two years' duration.

Previous to the camp at Alma several schools in the Waterberg District were notified, so that when the camp started in December, children from six schools had arrived. Those who could not obtain board locally camped out on a suitable spot and the necessary arrangements for an uncontaminated water supply and sanitation had to be made for some 25 children. The great difficulty was the fact that the only available water was the highly infected stream which passes the local school; this is used by the community for all purposes, including the washing of clothes. Even the possibility of night-soil buckets being occasionally emptied into it could not be excluded. This camp gave, therefore, a good opportunity for demonstrating to patients and their guardians how practical precautions could be taken under the most adverse circumstances. Altogether 58 children enrolled for treatment. Some 15 others were pronounced non-infected after two successive examinations. In this camp all the cases were treated with Fouadin. The patients were only discharged after examination had proved them free from infection, i.e., there were no ova or blood corpuscles in the centrifugalized urine, such urine being obtained not earlier than about 11 a.m., after the patients had had considerable exercise. When the treatment of all patients was completed, about the 8th January, a final attempt was made to enlighten the patients and such of the public as were present on how to prevent a recurrence of Bilharzia and how to deal with infested water.

In April the Committee decided that instead of organizing further camps better results would be obtained by assisting certain farm schools in badly endemic areas to put up bilharzia-free swimming baths, the water from which could also be available later for irrigation of adjoining land, where experimental agriculture could be carried out for the training of the scholars.

3. *Enteric or Typhoid Fever*.—Several outbreaks of the disease occurred during the year; some of these assumed epidemic proportions and were investigated by officers of the Department.

One outbreak, involving 29 schoolboys, occurred in November in a European boarding-school in Natal. The source of infection was a contaminated water supply. The domestic water was derived from boreholes, and it was surmised that the underground supply had become contaminated owing to undermining by old disused coal-mine works.

Another outbreak occurred in the same month in a village in the Cape Province. The feature of this outbreak was that it was confined to persons who had been to a dance, or to persons who had eaten food-stuffs which had been prepared for this function. How the food became contaminated, whether by carrier or otherwise, could not be ascertained; the infection was of a particularly virulent nature, involving 32 Europeans, several of whom died.

A third outbreak occurred in the Orange Free State, in August, in a native location, affecting 16 of the occupants. The infection was traced to a native woman, who was a visitor to the location and who, five days after her arrival, was found to be suffering from typhoid. This woman had apparently conveyed the infection from the farm where she ordinarily resided. The subsequent spread of the disease was effected almost entirely by flies; these insects were very numerous in the location, and the contents of the sanitary pails were freely accessible to them.

In February, 1932, an outbreak occurred in a rural area in Natal, affecting 50 natives, 14 of whom died. The attention of the Department was not drawn to this outbreak until some Europeans living in the neighbourhood contracted the disease. Investigation showed that the streams from which drinking-water supplies were obtained were subject to gross faecal pollution; bacteriological examination of specimens of the water, indicated, by the presence of the bacillus coli in 0.1 c.c., that such gross pollution had been taking place.

An outbreak which occurred in the North-eastern Karroo revealed, on investigation, that infection had been smouldering for a considerable time amongst the natives employed on farms in the area; no medical aid was sought until the disease began to manifest itself among the Europeans. An investigation carried out in April showed 5 natives and 7 Europeans to be actively suffering from the disease. No sanitary provisions of any kind existed for the natives employed on these farms, and the spread of the disease was obviously due to flies. The need for disposing of all night-soil, whether of European or native origin, in such a manner as to prevent fly-breeding or access of flies, was amply emphasized by this outbreak.

The notifications of typhoid in the Union indicate that it is still unduly prevalent, particularly in the small urban areas. The notifications during the last six years were as follows:—

1926-27	...	...	...	...	...	...	...	...	...	4,018
1927-28	...	...	...	...	...	...	...	...	...	5,787
1928-29	...	...	...	...	...	...	...	...	...	4,963
1929-30	...	...	...	...	...	...	...	...	...	3,775
1930-31	...	...	...	...	...	...	...	...	...	4,793
1931-32	...	...	...	...	...	...	...	...	...	4,505

The actual incidence of the disease is probably very much higher than these figures indicate, because of imperfect notification, particularly among natives, and the fact that the causative bacillus not infrequently produces a condition which is not recognizable, apart from special laboratory tests, as the disease typhoid. It is also probable that in many Bantus the clinical picture is, more often than not, absent. Many cases of typhoid are therefore likely to be missed in areas where modern laboratory facilities are not available or utilized.

The following table shows the Local Authority Areas in which the prevalence of the disease was unduly high:—

TABLE J.—ENTERIC OR TYPHOID FEVER—NOTIFICATIONS AND INCIDENCE IN CERTAIN LOCAL AUTHORITY AREAS DURING THE YEAR ENDED 30TH JUNE, 1932 (ARRANGED IN ORDER OF INCIDENCE RATE)—EXCLUDING CASES RETURNED AS “IMPORTED”.

Place.	Notifications.			Incidence per 1,000 of Population.		
	European.	Non-European.	Total.	European.	Non-European.	All Races
Koffiefontein.....M.	—	41	41	—	46·70	18·13
Alice.....M.	2	37	39	2·85	22·05	16·39
Sterkstroom.....M.	17	17	34	15·77	16·30	16·03
Rouxville.....M.	9	10	19	10·15	15·38	12·36
Greymont.....H.C.	13	—	13	11·64	—	11·27
Aliwal North.....M.	9	62	71	3·36	16·09	10·87
Tarkastad.....M.	16	8	24	16·24	6·40	10·74
Springs.....M.	7	213	220	0·91	14·28	9·74
Alexandra.....H.C.	—	20	20	—	8·85	8·83
Lady Grey.....M.	2	11	13	2·22	13·08	7·46
Kokstad.....M.	10	12	22	6·94	5·54	6·10
Vrede.....M.	17	2	19	10·69	1·21	5·86
Bethal.....M.	6	6	12	4·73	6·36	5·42
Ladysmith.....M.	12	26	38	3·28	7·30	5·26
Heidelberg (Tvl.).....M.	10	7	17	5·16	5·29	5·21
Molteno.....M.	7	5	12	5·48	4·14	4·83
Nigel.....M.	—	16	16	—	7·24	4·44
Brakpan.....M.	8	114	122	0·71	6·49	4·24
Boksburg.....M.	69	83	152	4·94	3·25	3·84
Paarl.....M.	44	10	54	5·63	1·51	3·74
Middelburg (C.).....M.	6	7	13	2·75	3·07	2·92
Benoni.....M.	27	116	143	1·53	3·40	2·76
Ladybrand.....M.	7	4	11	2·92	2·48	2·74
Malmesbury.....M.	8	4	12	3·09	2·18	2·71
Bloemfontein.....M.	38	84	122	1·62	3·62	2·62
Standerton.....M.	2	9	11	0·87	4·74	2·62
Randfontein.....M.	10	45	55	3·02	2·50	2·58
Krugersdorp.....M.	6	55	61	0·44	5·05	2·48
Ermelo.....M.	6	4	10	2·37	2·18	2·29
Uitenhage.....M.	14	22	36	1·50	3·44	2·29
Rodepoort.....M.	14	42	56	1·72	2·48	2·23
Mayville.....L.A. & H.B.	3	25	28	1·02	2·34	2·05
Queenstown.....M.	3	25	28	0·45	3·27	1·96
Klerksdorp.....M.	7	5	12	1·94	1·95	1·95
Craddock.....M.	9	4	13	2·49	1·13	1·82
Kroonstad.....M.	5	12	17	0·96	2·38	1·66
Hercules.....M.	7	3	10	1·56	1·86	1·64
Germiston.....M.	20	35	55	1·02	2·10	1·52
Pretoria.....M.	102	23	125	1·82	0·86	1·51
Witbank.....M.	1	10	11	0·37	1·93	1·40
Port Elizabeth.....M.	36	54	90	0·88	1·89	1·30
Graaff-Reinet.....M.	1	9	10	0·22	1·89	1·09
Capetown.....M.	103	140	243	0·75	1·23	0·97
Johannesburg.....M.	110	226	336	0·55	1·55	0·97
Potchefstroom.....M.	6	6	12	0·61	1·16	0·80
South Coast Junction L.A. & H.B.	2	11	13	0·63	0·77	0·75
Sydenham.....L.A. & H.B.	—	11	11	—	0·87	0·71
Durban.....M.	33	21	54	0·54	0·44	0·49
East London.....M.	15	3	18	0·74	0·17	0·47
Kimberley.....B. of H.	4	14	18	0·23	0·66	0·46
Pietermaritzburg.....M.	4	8	12	0·19	0·45	0·31

M. = Municipality.

H.C. = Health Committee.

L.A. & H.B. = Local Administration and Health Board.

B. of H. = Board of Health.

All European Rates calculated on Population as at Census 1931.

Non-European Rates calculated on Population as at Census 1921, except Capetown, Port Elizabeth, East London and Bloemfontein, which are calculated on Population as at Census 1926.

4. *Leprosy*.—During the year 637 lepers were admitted to the various institutions, 395 males and 242 females. Only 22 of these were Europeans, the remainder being non-Europeans, chiefly Bantus, of whom there were 581. A total of 296 deaths of lepers occurred at these institutions.

The number of patients in the institutions is shown in Table K (i) and the number of known cases remaining at their homes at the end of June in Table K (ii).

TABLE K (i).—LEPER INSTITUTIONS: PATIENTS THEREIN ON 30TH JUNE, 1932.

Institution.	European.		Native.		Mixed Coloured.		Asiatic.		Total.		Persons.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
Pretoria.....	73	37	451	288	76	44	5	1	605	370	975
Mkambati.....	—	—	148	102	—	—	—	—	148	102	250
Emjanyana.....	—	—	361	257	—	—	—	—	361	257	618
Amatikulu.....	—	—	169	100	—	—	—	1	169	101	270
Bochem.....	—	—	48	47	—	—	—	—	48	47	95
TOTAL.....	73	37	1,177	794	76	44	5	2	1,331	877	2,208

TABLE K (ii).—LEPROSY: CASES REMAINING IN THEIR OWN HOMES ON 30TH JUNE, 1932.

	Certified and Awaiting Removal to Leper Institution.	Home Segregated.	Probationally Discharged from Leper Institutions.		Total.
			Still under Surveillance.	Released from Surveillance.	
Cape (Province proper).....	—	2	139	148	289
Transkei.....	26	1	458	167	652
Transvaal.....	2	—	375	179	556
Natal.....	7	2	313	116	438
Orange Free State.....	—	—	78	33	111
UNION.....	35	5	1,363	643	2,046

The policy of probationally discharging cases classified as “arrested and non-infective” has continued to give satisfactory results. In particular the news appears to be spreading among sufferers who are at large that entering an institution does not necessarily involve life-long incarceration particularly if the treatment offered is accepted. Of 2,582 such patients discharged since the policy was started in 1923, only 199 had to be re-admitted subsequently owing to recrudescence. During the year under review 345 patients were discharged and 47 re-admitted.

This policy and other active propaganda methods, are having the effect of inducing cases to come forward voluntarily for treatment and the tendency to hide the disease from the medical authorities is diminishing. Many district surgeons in areas where there is a large native population now report that cases of leprosy are coming forward for treatment much more readily than formerly, but this still applies largely to the more advanced cases of the disease; only exceptionally does an early case report in this way. The early stages of the disease are often difficult to recognize even by medical practitioners. Nevertheless by active propaganda and the thorough examination of all intimate and even remote contacts with discovered cases of leprosy it is hoped gradually to bring such early cases under treatment and so prevent further infection.

During the year Dr. Wade, Chief Pathologist to the Culion Leper Settlement, Philippine Islands, visited the Union in his capacity as Secretary to the Leonard Wood Memorial Fund. Although Dr. Wade's report has not yet been received he expressed himself during his visit as very well satisfied with the administration and treatment of leprosy in this country. Institution officers had an opportunity of discussing with him the terminology suggested at the Culion Leprosy Conference and it was possible for certain points to be elucidated. But it was pointed out to Dr. Wade that certain cases that are common in South Africa did not appear to fit in with the classification; Dr. Wade agreed and promised to submit suggestions thereon after further consideration. The Department gave Dr. Wade all facilities to enquire into this matter and for this purpose he paid a protracted visit to the Emjanyana Leper Institution, where he obtained skin specimens which were prepared and sectioned at the Capetown Laboratory. His report is awaited with interest.

The intradermal treatment of Leprosy was also discussed. Up to the present the main difficulty has been to obtain a sufficiently pure and non-irritating ethel ester of Chaulmoogra oil. Dr. Wade offered his assistance but as the matter was urgent the departmental chemists in Capetown had to proceed with the preparation before his instructions and samples were received. They were able to produce a particularly pure drug within a few days and this is now being extensively used in the large institutions.

The visit of Dr. Wade was further fruitful in that it was possible to discuss a chart based on the new international terminology for the purpose of indicating the progress or otherwise in cases of leprosy. This chart has been in use in the Pretoria Leper Institution since and has so far proved very successful. Subsequently copies were received from Dr. Wade which were printed in London. Dr. Wade promised to publish this chart with the collaboration of Dr. le Roux.

5. *Malaria: Natal*.—The malaria epidemic which occurred during the autumn was the worst yet experienced in Natal. The disease occurred in all areas reached during the three preceding seasons and overflowed in epidemic form on to parts of the adjoining highveld, where only isolated cases had previously been known to occur. The breeding of *Anopheles costalis*, the carrier of the disease along the coast, was observed as early as October. Conditions throughout the season proved particularly favourable for its multiplication. By March it could be found actively breeding in practically every pool or puddle examined. This was strikingly different from normal seasons when a careful search has to be made for the larvae of this anopheline; many dips have to be made before specimens are collected.

The early months of the summer were excessively dry. This resulted in large extents of surface barren of vegetation which when fed by the later rains produced the unshaded collections of water favoured by *Anopheles costalis*. The early drought also resulted in the drying up of the larger rivers, leaving innumerable unshaded puddles in their beds in which *costalis* larvae flourished for great distances inland. Breeding in January, though active, was confined to the river valleys, spread being prevented by the drought elsewhere. Only sporadic cases of malaria occurred during January and February. The rains during the latter month established puddles over the vegetation-denuded surfaces away from the rivers, which soon became infected with mosquitoes from the heavily infested river valleys. Towards the end of March the big increase in malaria cases began. The March rains continued the process and precipitated the calamitous epidemic of April.

But disastrous as this epidemic has in many respects proved, there has yet emerged the fact that human communities are by no means helpless even in the most adverse climatic circumstances. Propaganda is gradually bearing fruit, and communities that conscientiously carried out the simple precautions have escaped with little or no infection, while their neighbours suffered grievously.

The little Indian village of Umzinto escaped malaria, though surrounded on all sides by infection, and constantly traversed by vehicles bringing natives from badly infected areas to local doctors for treatment. The community is supervised by a voluntary Indian Committee employing an Indian trained in anti-larval work. A sluggish river passes through the village and numerous seepages everywhere provide ideal breeding places. But every possible *costalis* breeding place was visited once weekly by the trained Indian, who dealt successfully with all of them, as proved by results.

This instance is quoted as strikingly illustrating Professor Swellengrebel's reiterated assertion of the localization of the malaria vectors and the comparative simplicity of control. In essence, this amounts in Natal to making certain that every *costalis* breeding place is found and dealt with once weekly.

In striking contrast with Umzinto were the conditions obtaining in the towns of Stanger, Verulam and Umkomaas, where the incidence of malaria was the worst of any in Natal towns. Systematic search for and treatment of breeding places was not made. None of them employed a qualified inspector and the first two towns mentioned did not even avail themselves of the opportunity of sending an official down to the Government classes in Durban for training in anti-larval methods.

As examples of other communities that were kept virtually free of malaria as the result of well-supervised anti-larval methods may be mentioned the Umhlanga Rocks Health Board and the Greenwood Park Health Board. Both of these had reason to be very well satisfied with the results of their efforts.

The Durban Corporation set out to combat the mosquito nuisance as a whole. This is a very vast proposition and one far beyond what was ever recommended by Professor Swellengrebel. On the contrary, he was at pains to point out that unless a community concentrated entirely on the eradication of the mosquito species responsible for the disease, this very species was liable to be missed because of its relative obscurity in comparison with other prevalent species. That the Corporation's efforts were by no means entirely successful was indicated by the number of infections that occurred within the borough area. The Department in Pretoria was inundated by requests for information as to whether it was safe to visit Durban. To these it was unfortunately necessary in view of the circumstances to reply that existing conditions during the months March to June inclusive could not be considered safe unless adequate precautions were taken.

The sugar industry as a whole suffered less from malaria this year than in previous years. This again can be attributed very directly to improved anti-larval methods. The incidence varied very greatly on different estates. One estate near Stanger carried out an effective anti-larval campaign throughout the summer and kept its fever incidence down to a very low figure, while planters immediately adjoining the estate and other mills in the vicinity where the control was unsatisfactory, were having serious labour troubles owing to the heavy toll of malaria.

An interesting instance of the quick punishment of any incomplete work may be mentioned. The mill and estate of the Tongaat Sugar Company extend over a very large area, consisting of fourteen farms. Fever had in previous years been severe over the whole of the 14 sections. This year active anti-larval control banished it from 12 sections; but it continued to occur on the remaining 2 until an unfortunate oversight in the anti-larval control there was discovered.

It cannot be too often reiterated that malaria is a local disease requiring to be combated by local measures which can usually only be effectively enforced by a properly constituted local authority thoroughly alive to the menace. The Government can act only in an advisory and supervisory capacity. The trouble is located in the lowly puddles in the vicinity of houses. The heroic measures clamoured for periodically from Government, besides being prohibitively costly, can never be as effective as the results achieved by communities in whom an active malaria conscience has been aroused. Rural areas with no local government continue to be very unsatisfactory. The Department has continually urged the necessity for the formation of local authorities in such areas.

The departmental staff in Natal which deals with malaria consists of a senior assistant health officer, Dr. Park Ross, in administrative charge, together with clerical staff; a pathologist with two assistants carrying out blood examinations, and one assistant carrying out mosquito examinations; three sanitary inspectors doing advisory and supervisory work in the field, including the examination of mosquito specimens; native malaria assistants, increased to a total of 38 when the epidemic was at its height.

Owing to indisposition, Dr. Park Ross was unable to undertake any field supervision work and Dr. E. H. Cluver was seconded for this purpose during the worst months. Dr. L. Fourie has now been transferred to Durban, so that in future there will be two professional administrative officers permanently headquartered at Durban. The laboratory work was very heavy. Examination of blood smears is carried out free of charge, and doctors availed themselves very extensively of this service. Identification of mosquito larvae was also carried out free of charge. The number of tubes of larvae sent in for examination increased rapidly from 19 in October to 203 in January, 243 in February, 398 in March, and 469 in April. The percentage of these specimens found to be *Anopheles costalis* also increased as the season advanced from 23.5 per cent. in November to 60 per cent. in April. These examinations were in addition to those carried out directly by officers in the field.

One of the most important duties of the field staff is supervising the work of local organization. Such organizations have been established along the entire length of the Natal and Zululand coasts. They are urged to employ trained staff. Classes in anti-malaria work are conducted by the Department to which local organizations are invited to send officers for training. Last year 56 Europeans were trained at such classes for duties with the various local organizations. The work done is steadily improving and it may be hoped that in the near future malaria will be brought under complete control in all the organized communities. The few that are neglectful will receive punishment so obvious as to serve as salutary examples to neighbours critical of all the effort spent on anti-larval procedures in their own areas.

The native malaria assistants have all received their training in classes conducted by the Department. These classes are attended also by natives in the employ of, or to be employed by, local organizations or sugar farms. They are trained in anti-larval work and also in clinical work in a hospital. These natives have proved most useful in recognizing *costalis* breeding places, and also in reporting outbreaks of the disease in the native reserves.

The native reserves constitute a very difficult problem. Extensive anti-larval schemes are, of course, out of the question, but limited schemes have been introduced with a fair amount of success at a few points, where the local natives were in a position to pay for such schemes.

The preventive campaign has consisted of the education of the people by means of the native malaria assistants who lecture and give advice on matters such as the correct siting of kraals, and breeding places of *Anopheles costalis*; systematic malaria tuition in the native schools; free quinine within reach of all and the establishment of depots for its distribution; initiation of treatment of cases by native malaria assistants and regular reports by them of the number of cases seen, spleen conditions, and accurate information as to those who have died.

The best service that can be rendered to the natives in the reserves under existing circumstances, is treatment in the early stages of the disease. This has been done by the establishments of depots, where quinine may be obtained free of charge. Early notification of illness is encouraged, and the depots are established in conformity with such information. The enormous consumption of quinine in the reserves during the past season indicates not so much the severity of the epidemic as the tremendous favour which this drug has found with them. This is the result of active education and a waning of the influence of the inyanga or herbalist.

Nevertheless large sections of the native community failed to avail themselves of the proffered quinine. This is to be attributed to active hostility of the native herbalists, and the large numbers of adherents of faith healers. One also encountered among the most superstitious classes a curious belief that quinine actually caused malaria, and that it was issued by a malevolent Government for this very purpose—witness the fact that quinine was being distributed in kraals before any fever appeared, but it appeared thereafter!

Another reason for refusal to take quinine must be laid at the door of European doctors. Some of these in Zululand treated all their private paying native patients by means of quinine injections. This is a much more impressive procedure than oral administration of Government tablets. The news of this form of treatment spread with amazing rapidity, and natives who could not raise money for injections refused to take tablets by mouth. The practice of these doctors was particularly unfortunate because of the fact now well-established that in the great bulk of malaria cases the route *par excellence* for quinine administration is the oral one. Only in exceptional cases, as for example in severe vomiting or where there are cerebral symptoms, is the otherwise dangerous and unnecessary injection method justified. The advantage of taking the quinine in fluid form was emphasized and it was given in this form wherever practicable.

The unusually high mortality which occurred among the native population is explained by two factors other than massive infections resulting from the *costalis* prevalence. It was heavy among those who for reasons above mentioned failed to avail themselves in time of the quinine offered. It was very heavy in those districts which had been famine-stricken just before. Fever superimposed on constitutions gravely weakened by malnutrition proved highly fatal particularly among children.

The actual malaria mortality is impossible of accurate estimation owing to the absence of any system of registration of native deaths. The native malaria assistants when visiting a kraal record the numbers of sick persons they see and write down the names of persons stated to have died of malaria since the beginning of the season. The total number of sick natives visited by them in the Reserves during the epidemic was 30,508. The deaths they recorded amounted at the end of the season to 2,620. As most of the kraals in the Reserves were visited it may be assumed that they were informed of approximately half the deaths that occurred. If the unlikely assumption is made that a similar number of deaths occurred in the portions of Natal and Zululand not included in the Reserves we arrive at a total of 10,000 deaths. It can be quite definitely stated that the deaths did not exceed this number.

A tribute must be paid to the voluntary work carried out by Missions during the epidemic. Their hospitals and clinics provided much needed help.

Many native evangelists acted as quinine distributors, gaining access to kraals which could no longer be reached by the native malaria assistants who had become immobilized at depots and treatment centres. Missionaries in some instances effectively preached malaria control from the pulpit; and they have been able to get quinine taken by suffering natives who were suspicious of the Government issue.

On July 1st an inter-departmental conference on malaria control was held in Durban. The Public Health Department was represented by Sir E. N. Thornton (in the chair), Drs. G. A. Park Ross, E. H. Cluver and L. Fourie; the Native Affairs Department by the Secretary, Chief Native Commissioner, six magistrates from native districts, the superintendent of Native Reserves, Eshowe, and the Director of Animal Husbandry; the Natal Provincial Administration by the secretary and the Medical Superintendents of Addington and Grey's Hospitals. The necessity for registration of native deaths was emphasized and it was resolved "that registration of births and deaths of natives should take place; if, for financial reasons, it is not found practicable to introduce general registration immediately, it should at least be introduced into certain Zululand and Natal districts; details as to the methods of effecting general registration should be left to the Native Affairs Department to work out in conjunction with local officers". Improved methods of early notification of outbreaks so as to allow of early action were discussed. The great desirability was expressed of seconding an officer from the Native Affairs Department, familiar with conditions in Zululand, to act as liaison between the Public Health Department and the natives in the reserves; the work done by Mr. Rodseth during past seasons was eulogised, and his appointment to such a post was recommended. The desirability of grouping the sugar industry into eight areas under a malaria committee was discussed, and it was recommended that Provincial legislation be expedited so as to ensure working schemes well before the commencement of next malaria season. Improvement in some of the very insanitary housing conditions on sugar estates was urged, and also the recruitment for work in epidemic areas of, where practicable, only malaria-tolerant native labour; much of this valuable labour is at present lost to mines where it is not specially needed. It was agreed that a reserve of trained staff for mobilization in epidemic times needs to be built up; courses of training for native evangelists, native agricultural demonstrators and others should be held in off seasons; Mr. Rodseth should build up in conjunction with local magistrates such mobilization staffs, which would be available in times of epidemic for educative work, food and quinine distribution, and other services for the sick. A communication should be sent by the Public Health Department to affected District Surgeons deprecating the unnecessary use of injection methods of quinine administration, and outlining their duties during epidemics. The greater use of mission institutions during epidemics was urged; subsidies to these institutions would be much the most economical method of providing services to the suffering natives during epidemics.

At separate meetings the representatives of the Public Health Department met the Malaria Committee of the South African Sugar Association where the improved anti-malaria organization which this body proposes to introduce was discussed, and the Health Committee of the Durban Borough Council where future precautionary measures of the Borough were discussed.

Transvaal.—In no part of the Transvaal did the incidence of malaria reach epidemic proportions. Localized outbreaks requiring visits by Inspectors of the Department occurred in December in the district of Zoutpansberg (N'Wanedi), in March along the Olifants River in Middelburg district, and during April and May at Waterpoort in Zoutpansberg district.

Effect was given to the recommendation made last year by Professor Swellengrebel for a field station for malaria control and research. This station was established in the Transvaal lowveld at Tzaneen in September. The research side of the work is being conducted by the Entomologist of the South African Institute for Medical Research, Mr. B. de Meillon, who has been stationed at Tzaneen so as to be able to work in close touch with the malaria medical inspector of the Department, Dr. Annecke, who is in charge of the local malaria staff. This consists of three male health inspectors, two lady health visitors and four native "spotters". He and his staff are concerned more particularly with educative and propaganda work and the economic problems connected with the control of the disease. The technical training of the staff in malaria prevention was carried out locally by Dr. Annecke and Mr. de Meillon, and was completed by December. They were then allotted areas for operation. Much of their time was taken up with personal talks with inhabitants regarding prevention of malaria. The health inspectors carried out systematic inspections of each farm visited, the data

being permanently recorded and indexed. The work of the lady health visitors was concerned more particularly with the families in their homes, and included instruction in malaria prevention, mothercraft, child welfare and domestic hygiene.

The areas covered by these five officers included Mokeetsi and the left and right banks of the Letaba River. The largest of these, the Mokeetsi area, includes the Brandboontjes, Koedoe and Middle Letaba Valleys; it is a relatively dry part of the lowveld, densely populated with large numbers of paupers intensively malaria-infected; the population of the farms along the rivers become infected chiefly by the *Anopheles funestus*; those of the dry farms are infected largely through the medium of the *Anopheles costalis* breeding in the unshaded puddles associated with the farm dams.

The population on the left bank of the Letaba is similar in its density, poverty and general lack of intelligence. In both areas the staff encountered reluctance in accepting the modern teaching offered. Progress is necessarily slow, being handicapped by deeply-rooted traditions and an entire disregard of malaria, the ravages of which are so very apparent in the children. These are difficult areas where many old beliefs and ideas regarding the disease have to be broken down. Only by laborious effort with constant visiting will obstacles be gradually removed and the population rendered fit to profit by the teaching.

The area lying north and east of Leydsdorp along the right banks of the Letaba and Selati Rivers is thinly populated. Here are good cattle ranches of some 3,000 to 5,000 morgen. The rainfall is low and only on the river farms is malaria a serious problem. But even on these the incidence is lower than on similarly situated farms elsewhere owing probably to the good siting of the homesteads and their distance from the river.

In addition to the routine work in these areas, an inspector accompanied district surgeons in systematic malaria tours in the Nylstroom, Potgietersrust and Zoutpansberg districts.

The native "spotters" have proved very useful. They have assisted at the station, and in the field they have at times operated independently of the inspectors. In the Nylstroom, Potgietersrust and Louis Trichardt districts they accompanied the district surgeons on their periodic bushveld tours, locating dangerous mosquito breeding grounds and collecting adult specimens in homesteads where malaria was present. They were used also to locate incipient breeding grounds in these areas, enabling field headquarters to act promptly where an outbreak was threatening. Thus it was possible to warn inhabitants of Waterpoort in the Zoutpansberg of impending malaria because of the active breeding of *Anopheles costalis* observed after a spell of rain. This warning was given well ahead of any actual sickness. No heed was, however, taken of the warning, with the result that a sharp outbreak of malaria occurred.

Larvicidal experiments were carried out on two streams using a third as control. The comparative cost and relative efficacy of oil and paris green dust were determined. In practice it was found that with equal efficacy paris green was the cheaper. Paris green has, however, certain decided disadvantages. Chief of these is that its use cannot be so well controlled as oiling; the presence of oil is easily apparent by its effects on vegetation and its smell persists for many days.

Work was also carried out on the habits and life histories of the mosquitoes known to be vectors of malaria. This has not yet reached a stage for reporting. The interesting fact, however, appears to have been established that the vectors are harmful because of a preference for confined, dark space—the ill-lit, dark, musty bedroom of the badly constructed dwelling. This was proved by means of Europeans sleeping in the very highly fever-infected valley of the Letsetele River. Two men slept in the open air on camp beds protected by nets, the third slept under a similar net inside a patrol tent. Specimens were caught every two hours through the night; *Anopheles funestus* was caught only in the patrol tent. This tropism for confined, dark space was again demonstrated by hanging a box with blackened inside walls in a dark native hut. It was highly favoured by the adults of the species and many were caught therein.

The value of the drug Plasmoquine in rendering human carriers of malaria non-infective to mosquitoes is being investigated. The work carried out this season has demonstrated satisfactorily that the infective forms of the malaria parasite in man are destroyed by the drug when exhibited in suitable dosage. But the experiments have not influenced the infectivity rate of the mosquitoes in the area. This failure appears to be due to a very rapid turnover of the mosquito population in native huts.

Other Departments.—Mention must be made also of the systematic anti-malaria work being carried out by the South African Railways. In accordance with Professor Swellengrebel's recommendation a full-time medical officer, Dr. Booker, has been appointed for this purpose. He is working in close touch with officers of this Department and already the work shows signs of bearing good fruit.

The Natal Provincial Government also carried out valuable work during the season. In addition to financing the quinine distribution in the native reserves, it kept the road along the Natal North Coast sprayed throughout the summer, in this way preventing much dangerous breeding of *Anopheles costalis*.

6. *Plague.*—As will be seen from the accompanying table, there were only 22 cases of plague, with 16 fatalities, in the Union during the year, all reported from the one Province—the Orange Free State.

TABLE L.—PLAGUE CASES AND DEATHS IN THE UNION DURING THE YEAR ENDED 30TH JUNE, 1932.

Province.	Number of Districts in which Outbreaks Occurred.	European.		Coloured or Native.		Total.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Cape.....	—	—	—	—	—	—	—
Natal.....	—	—	—	—	—	—	—
Transvaal.....	—	—	—	—	—	—	—
Orange Free State.....	4	—	—	22	16	22	16
UNION.....	4	—	—	22	16	22	16

These are the lowest figures recorded for the past nine years. Last year the cases and deaths numbered 71 and 44, respectively; the year before that—145 and 89.

Owing to the continued presence of plague infection among veld rodents over wide stretches of the country, the watchful policy of the Department has had of necessity to be continued. Plague was unknown here prior to 1899, in which year a small outbreak from infection introduced from India occurred in Delagoa Bay. During the Anglo-Boer war infection was introduced with forage and other articles imported by the British for military purposes from plague-infected ports in South America and India. Between 1900 and 1905 there were 1,694 cases reported from different parts of the country now forming the Union, resulting in 947 deaths. The main outbreaks occurred in Capetown, Port Elizabeth, Durban, East London and Johannesburg.

Subsequent to 1905 no human cases were reported until 1912, in which year a localised outbreak occurred in Durban.

In 1914 outbreaks occurred in the midland districts of the Cape Province. These were at first difficult to account for, since no recent infection had been introduced from neighbouring ports. The continued occurrence of human cases, however, necessitated very careful investigation, and it was only much later that it was realized that veld rodents—particularly gerbilles—were responsible for the sporadic occurrence of the disease among human beings.

Further investigation appeared to establish, without doubt, that this infection dated from the coastal outbreaks which occurred between 1900 and 1905. At some time during that period the wild rodents became infected, and this infection persisted among them after it had died out among the domestic rodents of the towns. It was the realization of the existence of smouldering infection among veld rodents that necessitated the adoption of a permanent anti-plague policy by the Government; Rodent Officers were appointed for purposes of survey, and for instructing Local Authorities in the taking of anti-rodent precautions.

The rodent population of the whole of the Union has now been very carefully mapped out. Careful surveys are continually being carried out in those areas where the incriminated species of rodents abound, and a strict watch kept on the spreading waves of infection among them.

The outbreaks responsible for the 22 cases during the year under review were confined to one Province—the Orange Free State. The four districts affected were Heilbron, Kroonstad, Lindley and Vredefort. The outbreaks were in each case investigated by officers of the Department, and the necessary measures were taken to prevent spread of the disease.

In Heilbron District the Department had been successful in 1930 in organizing farmers into “circles” carrying out anti-rodent work on their own farms, and most of them appeared to grasp their own responsibilities and the need for active measures on their own part. Since then, enthusiasm has waned. It has now proved impossible, either through the Secretary of the Farmers’ Associations or the Magistrate, to get farmers to do anything to help themselves, in spite of repeated visits of inspection by Rodent Officers.

In the Kroonstad District the grain-sheds of Co-operative Societies at several railway sidings and stations were found badly infested with rats, and therefore in grave danger of becoming plague-infected; at all of these, warnings were issued to render them vermin-free. These sheds were repeatedly visited by the Rodent Officers, and advice and demonstrations—especially in gassing by means of cyanide—were frequently given. Supervision work of this kind was found especially necessary in the Viljoenskroon and Bothaville areas. In some cases the rodents in these sheds became plague-infected; such sheds, as for example at Tygerfontein, were quarantined. The necessity for such measures will be apparent when the serious danger of transporting infected rodents or fleas is borne in mind. The Department also found it necessary to take stern measures in the case of a general dealer. Though human plague had previously occurred on his premises, and there was infection among rodents in the vicinity, he refused to render his premises rodent-proof; on threat of prosecution, however, he carried out all the requisite measures satisfactorily.

The farm in the Lindley District on which human cases occurred had to be quarantined for three weeks. The precautionary measures proved satisfactory, and no spread among human beings occurred. The Municipality of Edenville, which is in the vicinity of this farm, carried out satisfactory rodent destruction under the supervision of the Chief Rodent Officer of this Department, both within the town and in their Native Location. In this district, too, the publicity which the plague cases had been given was exploited to stimulate anti-rodent measures. Demonstrations were given, and the farmers urged to protect themselves. They co-operated to a certain extent, but the inability to purchase the necessary Cyanogas to carry out systematic rodent destruction was generally pleaded.

Apart from dealing with individual outbreaks, the Rodent Officers are kept continually employed in tracing and following up the spread of plague infection among veld rodents in the districts of the Northern Free State and the North-west Cape. Efforts are made to induce farmers to take the necessary precautions; as indicated above, this is often unsuccessful even in districts in which human cases of the disease have recently occurred. Local Authority areas and country stores are constantly being inspected and re-inspected and owners of property urged to rodent-proof their premises.

The anti-rodent staff employed by the South African Railways are also similarly employed in plague-preventive measures, such as the rodent-proofing of goods sheds and other buildings. The danger to the mealie industry, should infection occur in the stores of Co-operative Societies, at sidings, is a very real one. Indeed it was suggested in South West Africa, that the infection which caused the human deaths in that territory had been conveyed from the Orange Free State in mealie-meal. Fortunately as will be seen later this proved to be wrong.

Though no human cases of plague occurred in the Cape Province, the line of plague rodent-infection continued to advance in a southerly direction in the Van Rhynsdorp District, and has now reached almost to the banks of the Olifants River, near its mouth. The most recent infection in rodents was discovered on a farm some 40 miles from the town of Clanwilliam. Though the infection has not yet crossed into the Piquetberg District, the natural barrier against the migration of small rodents formed by the river and the Cedarberg Mountains, supplemented by the rodent-free belt made by the Government Rodent Staff, is liable to be crossed by hares; infection may also be conveyed across these barriers by means of vehicles carrying grain or other produce harbouring rodents or their fleas. Veld rodents, particularly gerbilles, are multiplying exceedingly in the Piquetberg, Malmesbury, and parts of the Tulbagh Districts. The Department’s efforts to induce the responsible Local Authorities and property-owners in these areas to keep the rodent population down to a minimum has met with very

little success. The Plague Regulations lay the responsibility for destroying rodents on the landowners; and Local Authorities are empowered to take the necessary action in regard to rodent-proofing of buildings. But with the exception of the Cape Divisional Council and the Capetown Municipality, the Local Authorities in the Cape Western Province have done little or nothing in this regard. Should plague rodent infection reach these areas, it would spread easily and rapidly—a very serious matter for Capetown and the districts which are among the most important grain-producing areas of the Union.

The infection among rodents in the Prince Albert, Laingsburg and Beaufort West Districts, reported on last year, has fortunately not spread further southwards in the direction of Capetown.

The Chief Rodent Inspector, while conducting a survey of the districts lying to the south of Bechuanaland Protectorate border, found evidence of a wave of infection which had extended westward from Mafeking along the Malopo River up to and beyond the South West Africa border at Rietfontein, as well as further south in the districts of Vryburg, Kuruman and Gordonia. With the exception of a recent extension southwards along the Malopo towards Upington, the epizootic appears to have occurred from two to four years ago. Towards the end of March, 1930, Mr. Austin Roberts, of the Transvaal Museum, found sick and recently dead gerbilles and numerous empty runs in the vicinity of Kuke Pan and Gomodimo, which are situated in the Kalahari in the Bechuanaland Protectorate some 300 miles east of Gobabis.

The outbreak of plague in Ovamboland was responsible for a total of 144 cases, of which 35 were fatal. Owing to doubts in South West Africa as to its nature and origin, it was investigated on behalf of the Union Government and with the concurrence of the South West Africa Administration by an Assistant Health Officer of this Department.

The report on the investigation, which was ably carried out by Dr. L. Fourie, is contained in Annexure A.

From this report and from the information collected during the course of rodent surveys in November, 1930, and June last, respectively, it seems clear that the infection responsible for the outbreak is due to the spread northwards, through the Kalahari into Ovamboland, of an epizootic which had passed over the districts between the Orange River and southern border of the Bechuanaland Protectorate in 1928 and 1929. The evidence obtained during recent surveys points to a subsequent extension westwards from the Kalahari into the settled parts of South West Africa. The non-occurrence of human cases in the districts outside Ovamboland is probably to be attributed to localized distribution or complete absence of the principal intermediaries between rodent and man over a large portion of the territory and, in regions where the intermediaries are met with, to the sparseness of the population and the abundance of the natural food supply, which, in the absence of cultivation, is likely to keep rodents from human dwellings. The investigation also conclusively disproved the theory that the outbreak was caused by the export of infected mealies or mealie-meal from the Union.

De Aar Disease.—In addition to itself employing and encouraging the use of accepted anti-rodent measures, the Department has promoted research into the possibility of destroying veld rodents by introducing among them infections harmless, or relatively harmless, to man. The discovery in 1925 of the so-called “Tiger River” disease encouraged the belief that a valuable weapon in our anti-rodent warfare had become available. Its pathogenicity for most animals is low. It was not found possible to infect larger mammals such as cats, dogs or monkeys. But the smaller veld rodents were easily infected experimentally, either by feeding or injection, and the disease was highly fatal among them. Veld experiments did not, however, prove very satisfactory, and it was not possible to light up an infection among rodents with the rapidly spreading and highly destructive effect of plague.

Towards the end of 1928 a sudden virulent epizootic occurred among gerbilles in and around De Aar. Bacteriological examination proved that this was not due to plague as was first suspected, but to a hitherto unknown virus; it was subsequently found to be causing a heavy mortality among gerbilles elsewhere. In all, it involves a tract of country measuring about 150 miles in a north-and-south direction, and some 250 miles in an east-and-west direction—including the districts of De Aar, Kenhardt, Calvinia, Fraserburg and Carnarvon. Thereafter, the possibility of utilizing this “De Aar Disease”, for the purpose of destroying rodents by starting an epizootic, was investigated. The 1928 epizootic had occurred almost exclusively among Namaqua gerbilles, and had very greatly reduced their numbers in the areas affected.

Early last summer further experiments were carried out on old lands near Ermelo, which were heavily infested with *Lobengula gerbilles*. De Aar Disease virus, from cultures supplied by the South African Institute for Medical Research, was used. Captive *Lobengula gerbilles*, after being marked for subsequent identification, were inoculated with the virus and liberated into a number of different gerbille colonies; these and neighbouring colonies were kept under close observation. No abatement in the activity of the occupants took place, and when the burrows were subsequently dug up no sick or dead animals were found. Under these conditions, at any rate, the disease appears to have no spreading power among *Lobengula gerbilles*.

7. *Rabies*.—Two fatal cases of human rabies were reported during the year—one a European male adult who had been bitten in the hand by a yellow mongoose, the other a native male adult who had been bitten in the lip by a genet cat; in both cases the biting had occurred three weeks prior to the onset of symptoms, and death had occurred six days later. The former occurred in the Carolina district; the latter in the Mafeking district.

A European child in the Wolmaransstad district, bitten by a presumably rabid yellow mongoose, was treated prophylactically by means of anti-rabic vaccine, and no symptoms developed. In the same district, four months later, a rabid domestic cat bit three persons; all three were treated with anti-rabic vaccine, and none developed symptoms. The rabies infection in this cat was subsequently established by bacteriological examination.

On a farm in the Vryburg district, an ox went mad, and bacteriological examination of post-mortem material showed the condition to have been one of rabies. This cause of death was also established in the case of a meercat that died in the Bethal district.

These cases occurring in widely scattered districts, serve as reminders of the fact that rabies is enzootic among certain veld carnivores in a considerable portion of the Union. Country children need to be warned of the danger of attempting to capture animals that, probably because of sickness, are unable to escape.

Stocks of anti-rabic vaccine are kept at the Government Health Laboratory, Capetown, and at the South African Institute for Medical Research, Johannesburg. This vaccine is a very reliable preventive if used soon after the individual is bitten by the rabid animal; if its use is delayed until symptoms of rabies develop, neither this vaccine nor any other known method of treatment will avail to prevent death.

8. *Silicosis*.—The measures for combating miners' phthisis on the Witwatersrand Gold Mines has reached a high degree of efficiency. The remarkable progress in this direction is indicated by the annual reports of the Chairman of the Miners' Phthisis Bureau. The principles that are so meticulously applied to the mines unfortunately have not always influenced silica dust-producing activities outside the mines.

Last April it came to the knowledge of the Department that drilling was being carried on in a highly siliceous rock in the process of construction of sewerage tunnels in Johannesburg. This construction work was being done by contractors. The men engaged in the drilling, in some cases miners' phthisis beneficiaries, were in no wise protected from the clouds of fine silica dust being produced. The matter was taken up by the Assistant Health Officer, Johannesburg, and in conjunction with the Government Mining Engineer, the Chief Inspector of Factories and the Medical Officer of Health, Johannesburg, immediate steps were taken to end this highly dangerous procedure and to prevent its recurrence in the future.

The future occupation of discharged miners is of importance to the gold-mining industry. Compensation is paid by the industry in the case of any ex-miner who is found *post mortem* to have suffered from phthisis. The employment of a discharged miner in a dusty trade is therefore unfair to the mining company which employed him.

9. *Smallpox and Vaccination*.—Small outbreaks occurred in three of the Provinces, as is shown in Table "M".

None of the 26 cases reported proved fatal. Nineteen of the patients, including one European, had not been previously vaccinated. The majority of the remaining patients had been vaccinated many years previously.

TABLE M.—SMALLPOX: CASES AND DEATHS REPORTED DURING THE YEAR
ENDED 30TH JUNE, 1932.

Province.	Number of Districts in which Outbreaks Occurred.	European.		Non-European.		Total.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Cape.....	6	3	—	13	—	16	—
Natal.....	—	—	—	—	—	—	—
Orange Free State.....	3	—	—	5	—	5	—
Transvaal.....	4	1	—	4	—	5	—
UNION.....	13	4	—	22	—	26	—

Owing to the mildness of many of the cases of smallpox in the Union, mistakes in diagnosis are not uncommonly made. This has been noticeable in recent years particularly among younger practitioners. For this reason it is considered desirable to set out some of the chief points of difference between smallpox and chickenpox in South Africa.

The impression created by statements commonly made in text-books is that chickenpox never affects adults and that the illness is always slight, whereas the general symptoms of smallpox are always severe. This view is apparently firmly held by many practitioners who support their diagnosis of smallpox by stating that the patient was an adult and the symptoms severe. In actual fact, cases of chickenpox among adults with symptoms much more severe than is common among children are of frequent occurrence in South Africa. In differentiating between the two conditions the age of the patient, severity of the symptoms and the usual signs—such as the amount of eruption, shottiness, umbilication, unilocularity and their situation on buccal mucous membrane or palmar and plantar surfaces—must to a large extent be disregarded.

The abortive attacks of smallpox which occur usually among persons vaccinated many years before and the cases with very few skin lesions are very difficult to diagnose with certainty. Such patients should be isolated and vaccinated.

Where the eruption is extensive, immediate diagnosis is generally possible if the other necessary data are available; previous history as to skin affections including vaccination, initial symptoms, distribution, character and synchronization of the lesions. In most mild cases of smallpox there is a story of a definite initial stage of illness lasting three or four days. Good light is essential when considering the distribution and character of the eruption, much more than is present in the average native hut. On first appearance the papules can be seen or felt on the face especially the forehead, but may not be fully out on the arms and hands; within the first 24 hours the rash is sufficiently established for a fair idea of its ultimate distribution to be formed.

In smallpox the number of spots on the face generally exceeds those on the chest and abdomen; the reverse is true of chickenpox. In smallpox the spots on the arms, forearms and hands increase in number towards the extremities in that order; in chickenpox the order of density is reversed. Any form of irritation or friction has a tendency to localize the eruption in smallpox, which accounts for the tendency of the spots to occur on extensor rather than on flexor surfaces. In smallpox the eruption is more dense on the dorsal rather than on the ventral surface of the trunk, again the reverse of what occurs in chickenpox. In both conditions vesicles commonly occur on the roof of the mouth. The eruption on the extensor surfaces of the forearms and backs of the hands are also of no differential value, as they are often very similar in both conditions. The lesions on the flank and back have most diagnostic value.

During the first 24 hours, smallpox lesions may appear simply as raised red papules, and at this stage, if two folds of skin including a single papule are picked up and rolled between the fingers, the papule will be felt as a hard and well-defined thing. In the case of chickenpox the papule can be felt, but it is more diffuse. On the second day, or later, the papule will still appear deep-seated, and if examined—preferably with a lens—it will be seen that there is a minute vesicle forming in the centre of the papule, possibly the size of a pin's head, and on each subsequent day the vesicle will be seen to have grown until it reaches the edge of the papule. On the third or fourth day a dark, somewhat depressed, spot appears in the middle of the vesicle. This gradually extends until the vesicle becomes hemispherical.

In the case of chickenpox, during the first 24 hours some of the papules will generally be found to be fully vesicular, the contents of which will be quite clear, like water. As the skin covering them is very thin, they look like small superficial blisters. Again, some of the papules may have a small vesicle in the centre like those of smallpox, and very often these do not appear to grow but remain small. Some other papules may not become vesicular at all.

Fully-grown vesicles coming suddenly into existence on the first day are very characteristic of chickenpox; at times they are large enough to be described as bullae. These are most often found on the abdomen. When they burst they generally discharge all their contents, and later may be found not as a scab but as a small attached piece of skin—such as may be seen after a superficial blister. On the other hand, some of the vesicles discharge a part of their contents only, and a small depressed scab develops, under which inflammation and ulceration often extend far beyond the limits of the original papule.

Fresh lesions may appear in the same area on successive days in both smallpox and chickenpox, and consequently the statement that chickenpox comes out in crops is not of much diagnostic value—especially as it is in the very mild atypical cases of smallpox, in which there are very few spots under observation, that fresh lesions for two or three days are most apparent. But fresh crops do appear more frequently in chickenpox than in smallpox, and this fact, coupled with the more rapid development of chickenpox, probably accounts for the polymorphic appearance of the rash in that disease.

In smallpox the vesicle, when fully formed is circular. In chickenpox the vesicle has an oval shape and an irregular edge in certain situations, especially in the flank and on the abdomen.

In smallpox, the areola surrounding a vesicle starts as a thin red line, and as the vesicle grows so does the areola, which becomes brightest and biggest in the early pustular stage. In chickenpox, the areola is broader and more irregular in shape, and may be seen on the first day surrounding any vesicle that is fully developed.

The exact date when the eruption first appeared is of importance. It is equally important in many cases to determine the maximum and minimum periods of time occupied by each stage in the maturation of the eruption in both smallpox and chickenpox.

The length of time taken in the maturation of the smallpox vesicle is very variable: usually it varies directly with the severity of the attack. In a severe case, on the 9th day a patient is still usually in the pustular stage; in a mild case most of the vesicles may have aborted and the lesions have scabbed over on the 7th day. In the case of chickenpox the development is much more rapid. Papules become vesicles within a few hours, and the first thing that claims attention is a fully developed vesicle. Some of the papules do not become vesicles at all, but disappear within a couple of days; others rapidly become vesicular and attain the limit of their growth in from six to thirty-six hours. Smallpox vesicles *never* attain their full growth in less than three days. On the other hand, chickenpox lesions have often started to scab by the third day, and when there has only been one crop of papules, may all have scabbed by the fifth day.

Again, the eruption of smallpox does not appear on all parts of the body at the same time. It usually follows a regular sequence, beginning on the face and gradually extending to the extremities. The rash on the lower extremity very often does not appear until 24 hours after that on the face, and throughout the whole course of its development remains behind the spots that first appear.

It must be admitted, however, that characteristics peculiar to variola minor often lead to anomalous and perplexing cases. Still, a correct diagnosis should be possible if all the evidence is systematically sought for and carefully reviewed.

The active enforcement of legislation in regard to vaccination has been continued. Tables summarizing the position will be found in Annexure B.

10. *Tuberculosis*.—Table N (i) shows the distribution of cases of tuberculosis notified during the year. The present total of 6,449 is an increase on that of last year, which was 6,148. This increased figure has, however, little significance except that possibly non-European sufferers are seeking medical aid in slightly larger numbers and thereby coming more under attention. There is no doubt that the notifications among non-Europeans still greatly under-estimate the prevalence of the disease.

TABLE N (i).—TUBERCULOSIS: NOTIFICATIONS DURING THE YEAR ENDED
30TH JUNE, 1932.

	European.	Non-European.	Total.
Cape (excluding Transkei).....	485	3,170	3,655
Transkei.....	2	651	653
Transvaal.....	72	1,265	1,337
Natal.....	107	554	661
Orange Free State.....	27	116	143
UNION.....	693	5,756	6,449

The report of the Tuberculosis Research Committee, originally established by the Transvaal Chamber of Mines and later expanded into a joint committee by the incorporation of representatives of the Union Government, was published during the year. It is a valuable volume, which deals exhaustively with tuberculosis as it occurs among South African natives—more particularly the mine employees on the Witwatersrand. The report shows that much of the tuberculosis which develops among native mine workers is to be attributed to the breaking down, under the stress of mining conditions, of tuberculosis lesions contracted while in the Territories. The danger of such infection imported from the kraals, where tuberculosis is endemic, is not confined to natives; there is a special menace to the white miner, whose simultaneous exposure to silica dust makes the presence of an infected native mine population a very serious risk—and a risk also to all Europeans who employ native nurses or houseboys.

The absence of a tuberculosis service in the Native Territories is seriously criticized in the report. It must be pointed out, however, that this criticism cannot be met until very considerably more funds are rendered available for public health services and more particularly for medical and nursing services in these areas.

The possibility of spread of tuberculosis in the families of boys returning from the mines in an infective state was carefully investigated by the Committee. Dr. Allan states that he was impressed by the paucity of instances where spread of infection in the families of repatriated mine-boys occurred. As possible reasons for this non-spread of infection are advanced: that the more acute cases die very soon after their return home, i.e., before there has been much time for infecting members of their families; that these natives from the territories are seldom in their huts except at night and during inclement weather, and that as long as they are able to move out of the hut they do so and sit in the sunshine; at night they cover their heads with their blankets thus preventing dissemination of spray; there is a fire burning in the hut into which the sick boys spit; when the tuberculous becomes too ill to move out of the hut he spits into a little ash, which is later thrown outside, where the sun soon dries it up and destroys the tubercle bacilli; among the rawer natives the women are not allowed to cross to the men's side of the hut.

The unsatisfactory position in the Union regarding tuberculosis in dairy cattle was commented on last year. During 1930, the Division of Veterinary Services of the Department of Agriculture instituted a campaign to eradicate tuberculosis in dairy herds at Durban. Some of the principal results and conclusions from this campaign were ably summarized by the Deputy Director at Onderstepoort, in a brochure entitled "The Bovine Tuberculosis Problem in South Africa." The campaign revealed that far more was needed than merely a small staff to administer and record reactions to the tuberculin test. The Department of Agriculture had therefore to lay down the following minimum requirements and conditions before a municipal dairy herd could be tested and permitted to be designated as "free from tuberculosis":—

- (a) Every animal in such a dairy herd shall have given negative reactions to two consecutive tuberculin tests, applied at intervals of from two to three months.
- (b) The hygienic conditions of the dairy premises shall be of such a nature as to prevent all possibility of infection of the animals found by the test to have been free from tuberculosis infection.
- (c) Only cows that have previously been shown by two consecutive tests to be free of infection can be added to a tested herd.

- (d) After careful supervision and inspection carried out at frequent intervals by a competent veterinary officer, none of the animals in the herd which gave negative reactions to the tuberculin test shall be found giving clinical symptoms of tuberculosis.

It will be obvious to anyone familiar with the hygienic conditions obtaining in town dairies in the Union, that compliance with this high standard will rarely be possible at present. These requirements should also make clear to all local authorities the urgent need for greatly improving the standard of inspection, and the necessity for the enforcement of local dairy by-laws. The policy advocated by the Department of Agriculture, that every large local authority should appoint a qualified veterinarian to supervise and control inspection of all its dairies, as well as its abattoir and draught animals, is strongly endorsed by this Department.

The brochure contains also important figures on the incidence of human tuberculosis of bovine origin in South Africa, as well as on the incidence of tuberculosis found in many herds tested with tuberculin in Government Institutions and various rural areas in the Union. The percentage of positive reactors in some of the rural areas was found to be very high. These results emphasize again the necessity, under present conditions, for protecting infants from milk-borne disease—by means of boiling or pasteurisation—in all areas where the strict application of the test under the conditions specified cannot be carried out.

A special committee appointed by the People's League of Health to make a survey of tuberculosis of bovine origin in Great Britain reported last October that it was estimated that about 6 per cent. of all deaths from tuberculosis are caused by the bovine type of bacillus; that about 2,000 deaths, mostly in children, occur annually from this cause; that at least 4,000 fresh cases of bovine infection develop each year; and that an immense amount of suffering, invalidity and often permanent deformity is caused by this bacillus.

Nelspoort Sanatorium.—The following table summarizes the work of the Institution during the year:—

TABLE N (ii).—ADMISSIONS, DISCHARGES, AND DEATHS DURING THE YEAR ENDED 30TH JUNE, 1932.

	Total.	European.			Non-European.		
		Male.	Female.	Total.	Male.	Female.	Total.
In Sanatorium on 1st July, 1931							
Admitted during year.....	97	34	28	62	18	17	35
TOTAL.....	290	95	88	183	71	36	107
	387	129	116	245	89	53	142
Died during year.....	13	5	4	9	2	2	4
Discharged during year.....	283	94	83	177	69	37	106
TOTAL.....	296	99	87	186	71	39	110
In Sanatorium on 30th June, 1932	91	30	29	59	18	14	32

The patients admitted during the year were in the following stages of the disease:—

Race.	Stage I.	Stage II.	Stage III.
European	10.4 per cent.	57.9 per cent.	31.7 per cent.
Non-European ...	14.0 per cent.	58.9 per cent.	27.1 per cent.

Of the 290 admissions during the year 258 were free, half their cost being paid by the local authority and half from the Department's vote, 21 were part-paying or contributing, and 11 were full-paying patients.

The average stay of patients in the institution was: Europeans, 110 days; non-European, 97 days.

Of the 283 patients discharged, 121 were noted as "much improved", 134 as "improved", 26 as "stationary", and 2 as "worse".

The difficulty in securing the early type of case, which benefits most from sanatorium treatment, particularly from the smaller local authority

areas, continues. Too often the patient is retained in an unsuitable environment until he is no longer able to pay for private medical attention, and unlikely to benefit from sanatorium conditions; an attempt is then nevertheless made to secure admission. During the year Capetown Health Authorities, for financial reasons, reduced the number of patients for Nelspoort. Patients from other local authorities were therefore admitted in larger numbers, although it was realized that many of them were unsuitable. The results proved even worse than was expected, seven of these patients dying during the one month of February.

The Medical Superintendent has on various occasions stressed the fact that the Sanatorium can only be regarded as part of an anti-tuberculosis scheme. An essential part of the scheme should be bureaux or dispensaries for the classification of cases, early cases being sent to the sanatorium and arrangements made for the isolation of advanced cases near their own people.

Another disappointing feature of the work of the Sanatorium is the unsuitable home surroundings that patients have to return to. Individuals in whom the disease has become arrested or improved are often forced by economic factors to resume in their home town a mode of life which quickly nullifies the good results of sanatorium treatment.

There is an increasing demand for active treatment in addition to the routine sanatorium measures. Thirty patients—23 Europeans and 7 non-Europeans—were successfully treated by means of artificial pneumothorax; treatment of two other cases had to be discontinued because of adhesions. This method of treatment has been very seriously hindered by the lack of X-ray facilities; funds for providing at least screening facilities have recently been made available.

Courses of Sanocrysin were given to two patients only. Variable results have been had with this preparation in the past; some do very well on it, while in apparently similar case no beneficial action results. The theory of its action is that it upsets the equilibrium existing between the tissues and the tubercle bacillus; at most there is, therefore, only an even chance of improvement in the patient's condition.

11. *Typhus Fever*.—The incidence of this disease, as shown in the accompanying table, continues high; a total of 1,550 was reported. Last year the number was 1,541 and the year before that 1,782.

TABLE O.—TYPHUS FEVER: CASES AND DEATHS REPORTED DURING THE YEAR ENDED 30TH JUNE, 1932.

Province.	Number of Districts in which Outbreaks Occurred.	European.		Non-European.		Total.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Cape.....	34	25	2	1,238	221	1,263	223
Natal.....	11	7	—	44	11	51	11
Orange Free State.....	3	1	—	39	12	40	12
Transvaal.....	6	—	—	196	46	196	46
UNION.....	54	33	2	1,517	290	1,550	292

As in previous years, the great bulk of the cases occurred in the native territories of the Cape, and it was again in the poorest regions that the incidence was highest. In the districts of Glen Grey, Libode, Xalanga and Ngqeleni the disease prevailed practically continuously throughout the whole year. The problem of eradication is greatest in such regions where the population is collected into dense aggregations, and is wedded to old insanitary customs. Lice, the vectors of the disease, are always associated. In not a few of the outbreaks, wedding feasts and funeral gatherings provided the necessary contacts, and the departing guests broadcasted the infection.

The Department has as yet only one Typhus inspector in its permanent employ for dealing with such outbreaks. He is suitably provided with a motor-car for rapid travel and conveyance of the necessary equipment. But on several occasions when outbreaks occurred simultaneously in areas far separated, additional partially trained men had to be employed temporarily.

Outbreaks also occurred in a number of municipal native locations, but were quickly suppressed. The few sporadic cases that occurred in the large towns were easily dealt with without any risk of their spread.

The serious outbreak in the Lichtenburg alluvial diggings, described last year, continued for some time, but was finally stamped out in February, 1932; here the persistence of the infection was again attributable to overcrowding of native labourers, and their itinerant habits.

The seriousness and persistence of outbreaks of typhus in the Union render it necessary to continue stressing the importance of personal cleanliness—and the duty of employers to keep themselves informed of cases of illness among their employees, and the necessity, when cases occur, of providing soap and hot water, so that reasonable cleanliness may be maintained.

Several recent observers have come to the conclusion that some of the cases that occur among out natives, while closely resembling typhus, probably represent a different clinical entity, the virus of which is not conveyed by the louse but by a rat parasite such as the flea. Hitherto it has been generally accepted that there exist in South Africa only two diseases of the typhus group, namely, ordinary typhus, which is conveyed by lice, and tick-bite fever, which is clinically like mild typhus, conveyed by ticks. The evidence for the existence in South Africa of a third member of the typhus group is by no means conclusive. The possibility of the cases described being ordinary typhus, where the observer was unable to find the louse responsible for infection, cannot be entirely excluded.

12. *Venereal Diseases*.—The following table summarizes the work done during the year in connection with venereal diseases by district surgeons, local authorities and institutions:—

TABLE P.—VENEREAL DISEASES: CASES TREATED AND ATTENDANCES, YEAR ENDED 30TH JUNE, 1932.

Locality.	In Hospital.				Outdoor Attendances.*			
	Syphilis.		Gonorrhoea and Other Venereal Diseases.		Total.		Syphilis.	
	European.	Non-European.	European.	Non-European.	European.	Non-European.	European.	Non-European.
(1) <i>By District Surgeons.</i>								
Cape.....	24	1,411	15	266	39	1,677	761	8,273
Natal.....	4	257	1	73	5	330	68	2,276
Transvaal.....	9	646	2	—	11	646	298	5,441
Orange Free State.....	—	33	8	5	8	38	244	4,569
(2) <i>At Institutions and Clinics.</i>								
Barberton.....	—	277	—	—	—	277	—	—
Belfast.....	1	—	—	—	1	—	—	—
Bethlehem.....	—	19	—	8	—	27	—	—
Bloemfontein.....	2	223	15	58	17	281	343	658
Bochem.....	—	579	—	4	—	583	—	455
Boksburg.....	3	13	7	5	10	18	—	127
Capetown.....	42	142	59	28	101	170	6,569	12,064
Craddock.....	—	115	—	—	—	115	—	—
Durban.....	24	624	68	138	92	762	780	1,106
East London.....	—	—	—	—	—	—	438	880
Elim.....	5	569	—	20	5	589	—	40
Johannesburg.....	—	—	—	—	—	—	5,858	—
Kimberley.....	9	174	—	42	9	216	43	1,910
Kingwilliamstown.....	—	110	—	3	—	113	2	21
Kroonstad.....	—	—	—	—	—	—	—	1,379
Krugersdorp.....	—	—	—	—	—	—	28	27
Kuruman.....	—	36	—	—	—	36	—	16
Marianhill.....	—	5	—	1	—	6	—	—
Olifantshoek.....	—	—	—	—	—	—	—	—
Oudtshoorn.....	—	—	—	—	—	—	27	141
Parys.....	—	—	—	—	—	—	21	198
Pretoria.....	—	—	—	—	—	—	2	10
Port Elizabeth.....	1	15	—	5	1	20	1,045	6,681
Potchefstroom.....	—	—	—	—	—	—	1,007	4,403
Port St. Johns.....	—	—	—	—	—	—	—	2,081
Pietermaritzburg.....	—	15	—	—	—	—	—	45
Rietfontein.....	72	2,338	209	743	281	3,081	106	964
Sekukuniland.....	—	26	—	—	—	26	1,485	9,478
(Jane Furse Memorial)							22	1,894
Springs.....	—	—	—	—	—	—	—	205
Standerton.....	2	8	—	—	2	8	—	—
Stellenbosch.....	1	25	—	—	1	25	—	—
Swellendam.....	—	19	—	1	—	20	—	—
Uitenhage.....	—	64	—	—	—	64	224	1,880
Victoria West.....	—	—	—	—	—	—	—	12
Vryburg.....	—	129	—	3	—	132	—	359
TOTAL.....	199	7,872	384	1,403	583	9,275	19,371	69,087
							21,161	11,010
							40,532	80,097

* Attendances only: Patients attend three times on an average.

The total number of Europeans treated shows an increase as compared with last year, whereas somewhat fewer non-Europeans were treated.

There does not appear to have been a marked increase in the incidence of these diseases; but it is also true that there is no evidence of any diminution. The Department has continued to encourage local authorities to institute and maintain clinics for treatment and prevention. The necessary drugs are supplied free of charge to such clinics and also to District Surgeons. Further, two-thirds of the approved net cost, less 40 per cent. during the current financial year, of recognized clinics is refunded by the Department. Many local authorities have availed themselves of these facilities; but there are many others who have as yet taken no steps to combat this social evil.

VI. GENERAL.

1. *Sanitation*.—The Department has continued the policy of supervising the sanitary and health conditions prevailing in the areas of local authorities in the four provinces of the Union. Though necessary to curtail somewhat the expenditure on this branch of the work owing to the prevailing financial stringency it has yet been possible to carry out systematic inspections in the areas of 55 local authorities.

There is no doubt that these systematic inspections, which are followed up by a comprehensive report dealing with all matters affecting the public health in the given area, have a valuable educative effect. They are carried out in areas in which no whole-time medical officer of health is employed. In such communities it frequently occurs that, owing to the fact that there is no person with the requisite knowledge and experience, incorrect and wasteful sanitary methods are adopted and many essential sanitary services are neglected. This is particularly true in the case of the smaller local authorities; it is to such smaller local authorities that the visit of an officer of this Department is of great value.

As a result of this system of inspections considerable improvement in public health and sanitary measures has occurred in many of the smaller municipalities in recent years. Experience has shown that a personal visit by an officer of the Department is of much greater value than prolonged correspondence. Itinerant officers, apart from carrying out local inspections, frequently have opportunities of meeting councillors, either individually or collectively, and this enables discussion to take place which result in the clearing up of many misconceptions previously held. In this way, too, it is often possible to arouse enthusiasm for matters affecting the public health where formerly a spirit of apathy prevailed.

Most of the local authorities in the Union have had the benefit of at least one systematic inspection during recent years while many have been inspected more than once. Apart from the visits of health officers the services of departmental health inspectors have also been utilized, when not required for other purposes, to follow up inspections which had previously been carried out by health officers. In this manner local interest in public health and sanitary measures is sustained.

The submission to this Department of annual reports from each local authority in the Union enables an additional watch to be kept on local public health and sanitary matters. In addition, the local incidence of infectious diseases, and particularly of enteric fever, serves as a useful index as to the state of the public health in a given area.

The measures detailed above enable this Department to advise, encourage and where necessary to bring pressure to bear on local authorities where the public health and essential sanitary services do not conform to modern standards.

2. *Housing*.—Full details of the working of the Housing Act, No. 35 of 1920, from the date of its commencement, are given in the report of the Central Housing Board for the calendar year 1931, which was laid in typescript on the Tables of Parliament. A summary of the position as at 30th June, 1932, is given in the following table:—

TABLE Q.—HOUSING ACT, No. 35 OF 1920: WORKING FROM PROMULGATION (16TH AUGUST, 1920), TO 30TH JUNE, 1932.

Province.	Loan Applications Approved.			Loan Issues.	Number of Houses				
	European.	Non-European.	Total.		Completed.	Under construction.	Approved, but not yet commenced.	Total for European occupation.	Total for non-European occupation.
(A) <i>Economic Housing.</i>	£	£	£	£					
Cape.....	1,202,713	600,679	1,803,392	1,738,886	6,093	85	162	1,954 (a)	4,386 (b)
Natal.....	537,197	86,877	624,074	574,662	751	42	153	520	426 (c)
Orange Free State.....	489,736	13,539	503,275	498,347	1,216	54	14	589	695 (d)
Transvaal.....	819,580	223,220	1,042,800	1,016,439	3,107	25	20	1,033	2,119 (e)
TOTAL.....	3,049,226	924,315	3,973,541	3,828,334 (f)	11,167	206	349	4,096	7,626
(B) <i>Sub-Economic Housing.</i>									
Cape.....	77,000	231,268	308,268	92,739	337	42	577	330	626
Transvaal.....	9,400	—	9,400	8,039	25	—	—	25	—
TOTAL.....	86,400	231,268	317,668	100,778	362	42	577	355	626
TOTAL (A) AND (B)...	3,135,626	1,155,583	4,291,209	3,929,112	11,529	248	926	4,451	8,252

(a) Includes a hostel to accommodate 86 persons.
(b) Includes 1,105 single rooms in blocks, 4 barracks, and 60 flats in four blocks.
(c) Includes 3 barracks and 28 single rooms in blocks.
(d) Includes 24 single rooms in blocks, the balance of 671 representing the approximate number of dwellings to be built out of a total loan of £12,739 made to three Local Authorities for use exclusively in purchasing materials to be advanced to Coloured persons and Natives building their own homes.
(e) Includes 278 single rooms in blocks, 3 compounds and 13 hostels.
(f) Includes £701,624 re-issued out of repaid capital.

The period under review saw a considerable slowing-down of activities under the Act due to a more cautious outlook on the part of a number of Local Authorities in embarking on fresh housing schemes. Owing to the depression, Local Authorities have more than ever felt it necessary to assure themselves that they will not be left with houses, the rent of which the poor in times like the present are unable to pay, and the Central Housing Board itself has had necessarily to be very careful in encouraging certain Local Authorities to proceed with such schemes, in view of the financial position and the possibility of a restriction in industrial activities rendering these schemes unnecessary for the time being.

At the same time there is the possibility of the present economic position being unduly stressed as a reason for delaying long overdue action for improving the housing conditions of the poorer classes in certain localities, and welcomed by vested and other interests antagonistic to measures of reform, as a handle for opposing suitable and well thought out schemes formulated by the local authority, and this aspect of the matter has not been overlooked. As bearing on the plea of "bad times", it is appropriate to refer here also to recent applications received from two local authorities for affording relief to certain holders of individual loans, by extending the period of repayment beyond the twenty-year limit laid down in the Act, and in another instance sanction was solicited by a local authority for the temporary suspension of the payment of redemption charges in respect of advances made under the Act; apart, however, from the legal objection, the conclusion was come to that on grounds of general policy the applications were not such as could be favourably entertained.

The expenditure of loan funds under the Act has been looked to as a means of affording some measure of help in creating work and so assisting in dealing with the present-day acute problem of unemployment, but here again it has been necessary to display caution and guard against the inauguration of schemes viewed mainly from the point of affording employment rather than of any existing need for additional housing. As a case in point, mention is to be made of an unsuccessful application for an allocation of funds under the Act made by a certain centre, where it appeared there was no house shortage or appreciable number of unfit dwellings to be replaced, and on enquiry being made as to the considerations which weighed with the local authority in submitting the application, it transpired that the main purpose was to relieve stagnation in the building industry. While sympathising with a proposal designed to relieve unemployment, this in itself cannot be accepted as an authorized object for which loan funds under the Act may be expended and, in addition, there must be evidence of an existing need for more housing.

Under the Government's loan scheme for sub-economic housing, which was designed for the purpose of aiding local authorities to provide dwellings for the very poor who are unable to pay economic rentals, it was made a condition precedent to the granting of financial assistance that the local authority make a satisfactory and detailed survey of the housing conditions of its area, and submit a report thereon classifying all poor-class dwellings into certain categories. Other important conditions were that the local authority should, *pari passu* with the carrying out of the scheme of new construction, actively proceed with measures for the reduction and prevention of overcrowding, the repair, or the closure and demolition of dilapidated, insanitary and unfit dwellings, and the improvement and removal of slum and unhealthy areas; further, that in calling upon owners of unfit dwellings to have their premises demolished, the local authority endeavour to make the order of demolition coincide with the provision of dwellings under the scheme, and that the new dwellings be reserved as far as possible for persons vacating insanitary and overcrowded dwellings. It was also made clear that loans under the scheme were intended to be used mainly for alleviating the housing conditions of the poorer classes among the European and coloured population, and not for facilitating the working of the Natives (Urban Areas) Act, No. 21 of 1923.

The five local authorities which up to the present have availed themselves of Government assistance for sub-economic housing, namely, the Municipalities of Capetown, Pretoria, Port Elizabeth, Graaff-Reinet and Mossel Bay, have endeavoured to comply generally with the conditions referred to in the preceding paragraph.

Coming to economic housing, none of the new schemes initiated during the year was of any magnitude, and nothing transpired which calls for special comment, unless reference be made to a temporary blockage of progress on further municipal housing at Capetown on account of a resolution passed at a meeting of the Council requiring future schemes to be referred to the

ratepayers for ratification; this it may be mentioned is not necessary in terms of the Housing Act. There is every reason, however, to anticipate that the opposition which a section of the Council has displayed towards housing schemes is only a passing phase and will not prevail, as is witnessed by a recent resolution of the Council authorizing the responsible committee to proceed with the erection of three blocks of tenements in the city at a cost not exceeding £16,200.

It is pleasing also to record that at Durban the Council intends shortly to proceed with measures for improving the housing of Indians in the Borough area, for which a sum of £50,000 has been ear-marked for the past three years out of loan funds under the Housing Act. Proposals have recently been submitted for carrying out a first instalment of the contemplated scheme at Cato Manor, involving the sale of 12 sites at an upset price of £45 each, on the understanding that the land and buildings thereon be used for residential purposes only and not for business purposes of any kind whatsoever, and that buildings to the value of at least £200 be erected upon the lot by the owner within two years from the date of sale. In addition, the Council has invited applications from Indian owners of land whose free-hold title is clear, and who are not owners of other land or houses, for loans with which to erect, in terms of the National Industrial Council Agreement, dwellings on such sites for their own personal occupation—the plans to be to the satisfaction of the Borough Engineer and subject to the approval of the Central Housing Board. It is disappointing to find from the last advice received that, despite very complete measures taken to ensure that the Indian community was made acquainted with the opportunities afforded by the Council to obtain loans, only eleven applications had been submitted.

In respect of the £500,000 to which the Government is committed for sub-economic housing, a sum of £77,143 was actually issued up to the end of last financial year (1931-32) for payment of work done and services rendered, thus leaving a balance of £422,857 to be provided, towards which an instalment of £100,000 has been provided on the Loan Estimates for the current financial year. In respect of economic housing, the Government's total commitment stands at £3,581,000 of which £3,108,476 was issued up to the end of last financial year (1931-32), leaving a balance of £472,524 still to be provided, towards which an instalment of £100,000 has been provided on the current year's Loan Estimates. For economic housing there are also available for drawing on, the repayments of capital falling available for re-issue which, for the current financial year, are estimated at some £110,000. The indications are that while the depression lasts, the demand for funds for economic housing will be greater than that for sub-economic housing. Unemployment is to be found to a greater degree among the class of person it is intended to assist under schemes of sub-economic housing, and as the rentals of houses built under such schemes are required to be fixed at a figure which will involve the local authority in a loss on the scheme at least equal to the loss to the Government in charging interest on the loan at 3 per cent. instead of at the economic rate of 5 per cent., local authorities are not disposed to risk the possibility of additional loss through having houses occupied by persons who cannot afford to pay even a sub-economic rental.

A review of the housing conditions of urban areas in the Union does not, it is feared, show any appreciable improvement during the last few years, as although a large number of new dwellings have been erected there has been a concurrent drift into the towns of the very poor—and latterly there has been such an increase of poverty that medical officers of health have had to move slowly in taking steps to remedy overcrowding. The Department does not doubt, however, that on the return of normal times local authorities will continue to shoulder their responsibilities and push forward vigorously with further schemes for ameliorating the housing conditions of the poorer classes.

Undoubtedly in the Union to-day the problem of bad and insufficient housing is to be found in its acutest form in the Cape Peninsula, where the growing expenditure in dealing with tuberculosis and other infectious disease—much of which must be attributed to the gross conditions of housing among the very poor class—and the consequent increasing claims made on the Government under the Public Health Act for a proportionate refund of such expenditure, is causing not a little concern. In alluding to this matter, the Department is not unmindful of the good work which the Housing Committee of the Capetown Council has already accomplished, often in the face of opposition from quarters which appear to favour unduly the interests of the slum landlord.

A perusal of the recently issued interim report on a housing survey carried out by the Council's Medical Officer of Health which was confined to dwellings of the poorer kind in the area of the old Capetown Municipality

shows that, while there are certain areas that are so congested with buildings that some or all of the houses in them are rendered insanitary and in which the evils can best be remedied by improvement schemes involving the clearance of buildings and the erection of new houses or blocks of tenements, the defective housing in the surveyed area is mainly the result of overcrowding of houses with more families than they can provide reasonable accommodation for. The report deals with 3,094 houses and 346 flats occupied by 30,960 persons, of whom 90 per cent. are non-European comprising 86 per cent. described as coloured and 4 per cent. as natives. A classification of the houses into (a) those that are fit for habitation for a suitable number of families (usually one) subject to the necessary repairs being effected, (b) those that would be so fit if they were reconstructed, and (c) those that are unfit for habitation even by one household and could not be made satisfactory by reconstruction, showed that 3,133 houses (and flats) or 91 per cent. fell in the first category, 304 or 9 per cent. in the second and only 3 in the last. As only 39 per cent. of the houses (and flats) were occupied as one letting, the balance being made up of 28 per cent. occupied as two lettings, 16 per cent. as three and 17 per cent. as more than three, the most definite conclusion drawn from the results of the housing survey is the pressing need for more dwellings for alleviating the existing overcrowded conditions.

It is a pleasure, also, to testify to the sterling work which the Capetown Citizens' Housing League Utility Company has performed, and is continuing to perform, in providing houses for the very poor under schemes financed under the Housing Act by way of housing loans granted through the Cape Town Municipality. In terms of that Act, such loans may not exceed 80 per cent. of the actual cost of the scheme, and in order to make up the balance of 20 per cent. the company has had to appeal to the public for contributions on as liberal terms as possible. In spite of the present day bad times, the response has been fairly generous and so far the company has been enabled to complete, at a cost of £6,800, a scheme of 26 cottages for occupation by coloured persons at Crawford, on the Cape Flats. This is being followed by a much larger scheme at Koeberg Road, Maitland, involving the erection of some 300 dwellings for occupation by the poorer European class at an estimated cost of £90,000—of which an instalment of 100 houses has been completed, and the company has now commenced work on a second instalment of 100 houses. A recent inspection of the completed houses shows that they have been well planned and economically constructed, and that they are occupied by families who it was stated were all previously living in overcrowded and insanitary conditions. All the householders who were questioned expressed themselves as more than satisfied with the change in their surroundings.

3. *Child and Maternal Welfare*.—Both infantile and maternal mortality rates show a gratifying improvement. In Table R (i) are shown the registration of births and deaths for European infants in the various provinces for each calendar year since 1919. The infantile mortality, i.e., the death-rate per 1,000 births during the year calculated from these figures is shown in a third column. In each of the Provinces the number of births registered during 1931 is smaller than that of 1930. Though in two of the Provinces, Natal and Orange Free State, more infants died, the total deaths for the Union was less than in any of the previous years, and the infantile mortality rate has been reduced to the satisfactory figure of 63, in striking contrast with the figures 82 and 90 of 1919 and 1920.

Registration of births and deaths and infantile mortality rates for European infants in each Province during the past year and the preceding twelve years are shown in the following table:—

TABLE R. (i).—EUROPEAN INFANTS: BIRTHS AND DEATHS UNDER ONE YEAR REGISTERED AND INFANTILE MORTALITY RATE,
I.E. DEATH RATE PER 1,000 BIRTHS, 1919-1931.

Year.	Cape.			Natal.			Transvaal.			Orange Free State.			Union.		
	Total European Births Registered.	Deaths of European Children under One Year.	Death-rate per 1,000 Births.	Total European Births Registered.	Deaths of European Children under One Year.	Death-rate per 1,000 Births.	Total European Births Registered.	Deaths of European Children under One Year.	Death-rate per 1,000 Births.	Total European Births Registered.	Deaths of European Children under One Year.	Death-rate per 1,000 Births.	Total European Births Registered.	Deaths of European Children under One Year.	Death-rate per 1,000 Births.
1919.....	16,749	1,351	80·66	2,910	191	65·64	15,338	1,326	86·45	4,727	382	80·81	39,724	3,250	81·81
1920.....	18,425	1,654	89·77	3,256	235	72·17	16,768	1,576	93·99	4,996	448	89·67	43,445	3,913	90·07
1921.....	18,062	1,382	76·51	3,370	203	60·24	16,582	1,374	82·86	5,288	379	71·67	43,302	3,338	77·09
1922.....	18,248	1,294	70·91	3,294	180	54·64	16·370	1,292	78·92	4,920	357	72·56	42,832	3,123	72·91
1923.....	18,296	1,353	73·95	3,229	197	61·01	15,619	1,261	80·74	5,037	328	65·12	42,181	3,139	74·42
1924.....	18,730	1,296	69·19	3,410	273	80·06	15,287	1,171	76·60	4,919	382	77·66	42,346	3,122	73·73
1925.....	18,366	1,343	73·12	3,509	206	58·71	16,348	1,059	64·78	5,188	361	69·58	43,411	2,969	68·39
1926.....	18,675	1,196	64·04	3,588	189	52·68	16,304	1,186	72·74	5,309	273	51·42	43,876	2,844	64·82
1927.....	18,537	1,293	69·75	3,435	166	48·32	17,050	1,359	79·71	5,325	314	58·97	44,347	3,132	70·63
1928.....	18,032	1,240	68·77	3,514	184	52·36	17,949	1,370	76·33	5,318	365	68·63	44,813	3,159	70·49
1929.....	19,008	1,169	61·50	3,650	177	48·49	18,227	1,342	73·63	5,334	280	52·49	46,219	2,968	64·22
1930.....	19,468	1,332	68·37	3,641	159	43·65	19,108	1,386	72·54	5,317	300	56·42	47,534	3,177	66·84
1931*.....	19,189	1,182	61·60	3,542	162	45·74	18,729	1,267	67·65	4,965	317	63·85	46,425	2,928	63·07

* Preliminary Figures.

Maternal mortality, that is death as a consequence of child birth, is very largely preventable if adequate anti-natal and post-natal nursing and medical services are available. The steady increase in this mortality rate during recent years has been therefore deplorable. The marked improvement last year is encouraging. The following table, R (ii) shows the maternal death-rate amongst Europeans in the Union for the last six years. It does not include deaths which may be associated with, but are not classed as directly due to child birth.

TABLE R. (ii).—MATERNAL MORTALITY: EUROPEANS.

Year.	Live Births Registered.	Deaths due to Puerperal Causes.				
		Number.		Rates per 1,000 Live Births.		
		Puerperal Sepsis.	Other Puerperal Causes.	Puerperal Sepsis.	Other Puerperal Causes.	Total Puerperal Mortality.
1926.....	43,876	88	112	2·06	2·50	4·56
1927.....	44,347	101	112	2·28	2·53	4·81
1928.....	44,809	102	121	2·28	2·70	4·98
1929.....	46,219	140	103	3·03	2·23	5·25
1930.....	47,536	119	131	2·50	2·76	5·26
1931*.....	46,425	100	119	2·15	2·57	4·72

* Preliminary figures.

These figures contrast unfavourably with those of some other countries. The total puerperal mortality rates for England and Wales during the years from 1926 to 1930 were 4·12, 4·11, 4·42, 4·33, and 4·40.

In Table R (iii) the European deaths from puerperal causes during 1930 are analyzed according to cause. It will be seen that much the most important cause is preventable septicaemia.

TABLE R. (iii).—EUROPEAN DEATHS FROM PUERPERAL CAUSES—1930 :
(ACCORDING TO AGE PERIODS).

Causes.	All Ages.	15-20.	20-25.	25-30.	30-35.	35-40.	40-45.	45 and Over.
Abortion.....	4	—	—	1	—	3	—	—
Ectopic Gestation.....	11	—	—	3	3	3	1	1
Other Accidents of Pregnancy..	1	—	—	—	—	—	1	—
Puerperal Haemorrhage.....	34	1	7	3	10	8	5	—
Other Accidents of Labour....	21	—	5	4	6	2	3	1
Puerperal Septicaemia.....	119	10	27	30	14	28	8	2
Phlegmasia Alba Dolens, Embolus and Sudden Death....	5	1	2	1	—	1	—	—
Albuminuria and Convulsions...	31	—	10	7	8	5	1	—
Following Child-birth (N.O.D.)..	23	1	3	7	3	4	4	1
Puerperal Diseases of the Breast	1	—	—	—	—	1	—	—
	250	13	54	56	44	55	23	5

Birth Control Clinics.—Clinics supported by voluntary effort for instructing necessitous mothers in the methods of birth control are being conducted in Johannesburg, Capetown, and Pretoria. The instruction is given to mothers where it is considered necessary for economic or health reasons to prevent further pregnancies or to have greater intervals between confinements.

The Johannesburg clinic was started on 2nd February of this year by the Race Welfare Society. It caters for Europeans only and is known as the Women's Welfare Centre. Some 200 cases have been dealt with. The average age of the mothers attending was 29 years, and the average number of children in each family was already 4. All belonged to the poorer classes; one-third were unable to make any contribution for their treatment, the remaining two-thirds paying an average of three shillings each. Apart from such payments the society depends on private donations. Eight doctors (6 female) attended the clinic voluntarily; one paid female nurse is employed.

The Capetown clinic was opened on 15th February primarily for necessitous European and coloured mothers. It is known as the Mothers' Clinic and is under the direction of an executive committee consisting of two medical practitioners and eight lay workers. The work is voluntarily done, the doctors receiving a small honorarium in accordance with the finances of the clinic. One of the lay workers is a trained nurse and others have had previous nursing experience. The maximum charge made to patients able to pay is five shillings. For the rest the committee depends on donations. The home conditions of most of the patients were known to the committee; the reasons for attendance were—unemployment of husbands, excessive number of children or bad health. The average age of the patients was 31; the average number of pregnancies per person 6. It appears that a high percentage of women of this class are in the habit of taking drugs as soon as they have reason to fear pregnancy; 45 of the patients admitted having attempted to procure abortion on themselves. The clinic is also consulted by childless mothers who wish to become pregnant.

The Pretoria Mothers' Clinic did not start until July, 1932. All the workers are voluntary. There is an executive committee of eight ladies, with two female practitioners as medical advisers. Nurses also assist voluntarily. The home conditions of all patients are personally investigated by members of the committee, and only deserving cases are dealt with. Only a very small proportion of the patients are able to make any contribution towards the cost of the materials supplied to them. For funds the committee depends on private donations.

4. *Nurses and Midwives*.—The serious shortage of trained and certificated nurses and midwives that has been stressed in previous years continues.

During the year it came to the notice of the Department that the facilities for the training of nurses and midwives through the medium of Afrikaans were very inadequate. The chief reason for this appears to be that there is no text-book on midwifery or on general nursing available in the Afrikaans language, and that lecturers on these subjects thought it inadvisable to lecture in Afrikaans while the students had to read up their subjects in English. It is understood, however, that, through the good offices of the Women's Federal Council, a medical practitioner of Bloemfontein has undertaken to translate a standard English text-book on midwifery into Afrikaans and that the book will be in print before the end of this year.

Similarly the Women's Federal Council has been instrumental in getting a standard English text-book on general nursing translated into Afrikaans and it is anticipated that this book will be published in the near future.

The regulations published in February, 1931, requiring registration of midwives by local authorities are proving very salutary. It has become possible for local authorities to exclude from practice many uncertificated persons who for various reasons were found unsuitable, and whose continued practice constituted a danger to the public health, while leaving in practice a sufficient number of women to meet the needs of the community. The reasons for refusing registration have usually been that the individual in addition to being unqualified is ignorant and dirty.

5. *Nursing and Maternity Homes*.—The enforcement of the provisions of the Public Health Act and the regulations thereunder, governing nursing homes in the Union is, with the co-operation of medical officers of health of the larger urban centres as well as of magistrates and the police, bringing about a gradual elimination of the undesirable type of nursing home, and the recognition and registration of more institutions with a high standard of efficiency as regards equipment of premises and personnel.

In accordance with the provisions of Section 38 (1) of Medical, Dental and Pharmacy Act No. 13 of 1928, the Department, in January, 1929, required that thereafter new nursing homes would be registered only if they were under the charge of qualified persons registered with the South African Medical Council. The more modern nursing home is therefore steadily replacing the oldfashioned and less well equipped type of home. Old established registered nursing homes are retained on the Departmental register only if on inspection reports thereon prove them to be satisfactory generally, although some of them may not yet be under the charge of qualified personnel. The consequence is that at present more than 80 per cent. of the nursing homes in the country are under the charge of qualified persons recognized by the South African Medical Council.

In many instances efficient but otherwise unregistered midwives, who previously conducted their own private nursing homes, are allowed to

continue midwifery practice provided they handle the cases in their patients' own homes. Both magistrates and police are actively co-operating with the Department in an endeavour to see that the legal requirements are strictly adhered to.

The position regarding nursing homes in the Union for the past four years, is reflected in the following table:—

TABLE S (i).—NURSING HOMES REGISTERED WITH THE DEPARTMENT.

Year.	Cape.	Transvaal.	Natal.	O.F.S.	Total.
1928-29.....	104	90	43	26	263
1929-30.....	124	91	54	29	298
1930-31.....	110	98	51	25	284
1931-32.....	95	94	44	26	259

Besides the magistrates and the police, the Director of Census lends valuable aid in notifying the Department regarding the existence of or closing of homes where the persons responsible have failed to advise the Department as required by regulation. During the year 34 new registrations were dealt with, while 43 homes were reported as having closed.

Consequent upon the publication of Government Notice No. 1698 of 26th September, 1930, which provides for the official certification of nursing homes in the Union, this Department has granted official certificates in respect of 99 nursing homes. The certificate is granted only after an official inspection shows the home to be satisfactory in every respect.

Inspections of nursing homes by assistant health officers of the Department and by medical officers of local authorities for the year are reflected in the following table:—

TABLE S (ii).—NURSING AND MATERNITY HOMES: INSPECTIONS DURING THE YEAR ENDED 30TH JUNE, 1932.

Place.	Number Inspected.	
	By Medical Officer of Local Authority.	By Government Health Officer.
<i>Cape Province—</i>		
Capetown.....	27	—
East London.....	7	—
Port Elizabeth.....	8	—
Elsewhere.....	9	16
<i>Natal Province—</i>		
Durban.....	13	—
Pietermaritzburg.....	3	—
Elsewhere.....	—	1
<i>Transvaal Province—</i>		
Johannesburg.....	—	—
Pretoria.....	8	—
Elsewhere.....	—	26
<i>Orange Free State—</i>		
Bloemfontein.....	—	1
Elsewhere.....	—	2
UNION.....	75	46
TOTAL.....		121

The systematic inspection of nursing homes, as far as assistant health officers of the Department are concerned, has been adversely affected by the general financial stringency imposed on the services of all Departments of State, and the cutting down of travelling expenses of officers to the lowest possible minimum has seriously mitigated against the carrying out of a regular programme of these very necessary duties.

6. General Hospitals.—The system of annual inspection on behalf of the Provincial Administrations of the State-aided hospitals and kindred institutions in the Cape Province, Orange Free State and the Transvaal was continued during the year. As before, the hospitals on the Reef and in Pretoria were inspected by the members of the Public Hospitals Advisory Council, while thirty-one hospitals and aided charitable institutions were inspected and reported on by different assistant health officers in this Department as opportunity arose. Owing to a shortage of staff and the necessity of reducing travelling to a minimum it was found impracticable to inspect all the institutions during the year. The remaining institutions will, however, be inspected in the near future and under existing circumstances each institution will probably be inspected at least once in every two years. It is satisfactory to note that progress is still being made towards meeting the shortage of hospital accommodation and generally improving conditions of the institutions under the control of the Cape and the Orange Free State Provincial Administrations.

In the Cape Province the foundations of the new Central Hospital at Capetown were completed during the year under review and it is anticipated that tenders for the superstructure will be called for in the near future. The new central hospital at East London is nearing completion. The extensions to the Provincial Hospital, Port Elizabeth, whereby 172 additional beds for patients were added to the institution, were completed and brought into use, while extensions to some other smaller institutions were also completed. A new hospital was opened at Kuruman. The scheme for the establishment of a State-aided hospital at De Aar seems to have made no further progress. The Princess Alice Home of Recovery for children requiring prolonged institutional treatment is nearing completion and will no doubt be taken over by the Cape Hospital Board within the course of a few months. A new hospital at Calvinia is in course of construction.

In the Orange Free State the construction of the new central hospital at Bloemfontein did not progress as fast as was anticipated, but it is now nearly ready for occupation. The extensions to the Northern Free State General Hospital were completed and brought into use. With regard to the remaining hospitals in this Province the position remains practically unchanged.

In the Transvaal Province the new Pretoria Hospital was occupied during the year, while a scheme for extensive additions and alterations to the Johannesburg General Hospital was prepared and submitted to the Provincial Administration for consideration. The new Roodepoort-Maraisburg Hospital was completed and occupied. Extensions to several of the smaller institutions were also completed. The scheme for the establishment of a hospital at Volksrust appears to have made no further progress. Plans for a hospital at Vereeniging were submitted to the Provincial Administration and the scheme is still under consideration. During the year the Public Hospitals Ordinance, No. 18 of 1928, was amended by Ordinance No. 22 of 1931, which effected a radical change in the system of financing the hospitals of this Province.

The hospitals in the Natal Province are not inspected by the medical officers of this Department, but as far as is known there is practically no change in the hospital position in this Province. It is understood that the scheme for erecting a new non-European hospital at Congella is still in process of preparation.

Chronic Sick Hospitals.—The very unsatisfactory position in regard to chronic sick hospitals in the Union was commented upon in previous reports and the position remains practically unchanged. The Transvaal Provincial Administration has definitely decided not to use the old Pretoria Hospital as a chronic sick hospital, but is prepared to sell this institution if permitted by the Union Government so to do and to devote the proceeds of the sale to extensions of the chronic sick hospital at Rietfontein.

7. Habit-forming Drugs.—The enforcement of the regulations regarding opium, dagga and other habit-forming drugs continues to be carried out.

This is done in co-operation with the Police, Commissioner of Customs and Excise and Postmaster-General. The following table shows the prosecutions and convictions:—

TABLE T.—SHOWING PROSECUTIONS AND CONVICTIONS UNDER LAWS RELATING TO HABIT-FORMING DRUGS DURING THE PERIOD 1ST JULY, 1931, TO 30TH JUNE, 1932.

Province.	European.		Native.		Asiatic.		Other Coloured.		Total.	
	Pro-secu-tions.	Con-vic-tions.	Pro-secu-tions.	Con-vic-tions.	Pro-secu-tions.	Con-vic-tions.	Pro-secu-tions.	Con-vic-tions.	Pro-secu-tions.	Con-vic-tions.
Cape.....	24	23	774	721	8	8	839	815	1,645	1,567
Natal.....	5	4	1,172	1,141	47	45	31	29	1,255	1,219
Transvaal.....	33	28	1,654	1,591	15	14	110	104	1,812	1,737
O.F.S.....	4	4	234	218	—	—	33	31	271	253
UNION.....	66	59	3,834	3,671	70	67	1,013	979	4,983	4,776

Of the total of 4,983 prosecutions, 4,976 were in respect of dagga and 7 of opium; 13 lb. 14 oz. of opium and large quantities of dagga were seized and confiscated.

The total quantities of habit-forming drugs imported into the Union during the year ended 30th June, 1932, were: Opium, 287 lb. 3,979 gr.; morphine, 85 lb. 5,248 gr.; cocaine, 43 lb. 4,922 gr.; heroin, 7 lb. 4,802 gr.; *Cannabis indica*, 16 lb. 5,951 gr.

The following habit-forming drugs were exported from the Union during the year ended 30th June, 1932: Opium, 12 lb. 388 gr.; morphine, 7 lb. 2,860 gr.; cocaine, 5,584 gr.; heroin, 538 gr.

The permit for the cultivation of dagga for export purposes issued to a farmer in the Koster area, Rustenburg District, Transvaal, was renewed for the calendar year 1932.

Apart from dagga-smoking by natives and coloured persons and opium-smoking by a few Chinese addicts, the illicit use of habit-forming drugs in the Union is comparatively trifling.

One hundred and ninety-seven registers of habit-forming drugs kept by chemists and druggists were inspected in various large centres including Capetown, Pretoria, Durban, and Port Elizabeth.

Every chemist and druggist or other person who ordinarily stocks habit-forming drugs is required in terms of Chapter 6 of Act No. 13 of 1928 to keep a register properly named and reflecting the quantity of the drug possessed, imported, or acquired by him; the date of importation or acquisition of the drug; the person from whom and the place from which the drug was imported or acquired; the quantities sold, supplied, used or administered, the purpose for which used, and the date of use, or the name and address of the person to whom sold, supplied or administered and the date thereof. In the many instances where the registers were found not to be properly kept, warning notices were issued and generally proved sufficient to ensure compliance with the legal requirements.

8. *Anaesthetics*.—During the year enquiries were made from nineteen hospitals in the Union as to the number of operations performed during 1930 and 1931, and the number of deaths during or connected with the

administration of an anaesthetic. The replies received were tabulated with those of the military hospitals, where records extending over a longer period were more readily available. The results are summarized as follows:—

Anaesthetic.	Number of Operations.	Deaths on Table due to—					Per 1,000 Anaesthetics.
		Anaesthetic.	Anaesthetic and Shock.	Operation while Moribund.	Surgical Accident.	Total.	
Ethyl Chloride and Ether	22,245	14	23	19	—	56	2·5
Chloroform and Ether..	35,550	19	17	17	—	53	1·5
Gas and Oxygen.....	959	—	1	2	—	3	3·1
Ether.....	3,238	—	3	15	—	18	5·5
Chloroform.....	1,236	4	—	1	—	5	4·0
Spinal.....	638	—	1	2	—	3	4·7
Local.....	10,264	—	—	3	—	3	·28
Ethyl Chloride.....	3,847	2	1	3	—	6	1·6
Avertin.....	75	—	—	—	—	—	—
Not specified.....	166	—	1	1	—	2	12·04
	78,218	39	47	63	—	149	1·90

The mortality for the military hospitals was ·83 per 1,000 anaesthetics administered. That for the Military Hospital, Roberts Heights, alone—where three cases have occurred in recent months—was up to the end of July, 1932, 1·29 per 1,000 as compared with 1·90 per 1,000 as shown in the above table.

No definite or detailed conclusions can be arrived at from the above figures, particularly as many of the hospital records are very incomplete, and the classification assigned in some instances by the hospital authorities is at least open to doubt. It is probable that a considerable number of the total deaths recorded in the above table have little or no cause in anaesthesia itself, but even allowing for patients being rushed into hospital for operative treatment as a last resort, it would appear that the mortality connected with the administration of anaesthetics in South Africa is considerably higher than has been believed.

It is thought that this is a matter which hospital authorities and others—particularly those responsible for the teaching of medical students—might well take into special consideration.

In the larger hospitals—other than the teaching hospitals—the majority of anaesthetics are administered by the junior resident staff, and the question arises whether it would not be a sound procedure at certain of these hospitals for trained anaesthetists to be appointed to deal, at any rate, with cases of special difficulty.

9. *S.A. Red Cross Society*.—The unfortunate position which arose some years ago resulting in the withdrawal in 1928 of the Cape Branch of the South African Red Cross Society from the Central Executive of that organization, has at last been remedied. Negotiations which have for some time been in progress between the Central Executive and the Cape Branch have had the fortunate result that the Central Executive Committee meeting held at Bloemfontein last December was attended by three delegates from the Cape body. The discussions were marked by an earnest desire to settle all differences of opinion and policy; the decisions taken at the meeting were unanimous and entirely satisfactory to the delegates. The Cape Committee subsequently ratified the steps taken by its delegates, and decided to resume membership of the National Organization in South Africa as a duly constituted branch under the new Constitution. It was agreed that the headquarters of the Society should be in Johannesburg. It is gratifying to record that their Excellencies, the Governor-General and the Countess of Clarendon, have been pleased to accept the Hon. Presidencies of the reunited National Society.

The amalgamation is already bearing satisfactory fruit. The Cape Branch has settled down to its programme of work, and already a considerable number of Voluntary Aid Detachments have been formed in the Cape

Province. All branches are working enthusiastically on this movement; there are now approximately 1,600 members of S.A. Red Cross Voluntary Aid Detachments and 250 members of S.A. Red Cross Ambulance Detachments in the Union.

Order of St. John of Jerusalem.—This organization is well established in South Africa. An impetus was given to its work by the grant of local government on the establishment of a Commandery for Southern Africa in 1929, to regulate the affairs of the Order locally. The Ambulance Brigade is organized in the Union into four Districts, with a fifth District representing the South African Railways & Harbours Administration. The Commandery Commissioner is Dr. Bennie Hewat. Large numbers of men are trained in ambulance work, and are constituted as Divisions of the Brigade; a good many women are similarly trained for Nursing Divisions. The contingent from Southern Africa to the Centenary Celebrations of the Order in the United Kingdom in 1931, was the largest from overseas. That their training had been good was shown by their success in winning trophies at the Empire First Aid Competitions, where the South Africans took first place in the men's and second in the women's team tests.

The Department makes a grant of £150 per annum to the Commandery, in order to assist it in extending its work to the smaller towns and villages of the Union. It has mainly operated in the past in the large centres of population. The Department is satisfied that the money granted has been applied to the best advantage.

10. *Meat Supplies.*—Adequate control and inspection of meat supplies by local authorities in many parts of the Union have become a matter of considerable difficulty in recent years.

In terms of the Regulations *re* Slaughtering and Meat Inspection made under Section 115 of the Public Health Act (No. 36 of 1919) local authorities are empowered to register annually every slaughterhouse or place where uncured or unpreserved carcasses or meat intended for sale are kept or stored within its district. In addition such premises are required to conform to certain stipulated hygienic and sanitary standards. Provision is also made for the examination of animals, carcasses and viscera by duly appointed meat inspectors.

The majority of the larger towns have enforced these regulations and have taken adequate steps to ensure that no diseased or tainted meat or meat prepared under unhygienic conditions is sold to consumers in their areas. Many complaints have, however, been received by this Department from local authorities that in spite of the fact that adequate control is exercised in their own areas they are powerless to prevent unsupervised meat from being imported, such meat imported from rural areas is often produced under very unhygienic conditions and is certainly not adequately inspected.

It would appear from information received that the following three methods of importing meat into a local authority area are being increasingly practised and that under these conditions it is possible for meat unfit for human consumption to be delivered to consumers in urban areas:—

- (a) In some areas rural butcher shops and slaughterhouses exist on the boundaries of an urban area and these butchers dispose of their products almost entirely to consumers resident within the urban boundaries. Inasmuch as the actual sale of meat in this instance takes place outside its area the local authority is powerless under existing legislation to prevent meat unfit for human consumption from reaching the consumers in its area.
- (b) In other local authority areas it is a practice for farmers to deliver meat to customers resident in town although the actual sale of meat takes place outside. The conditions under which such meat is prepared for sale are conducted without any supervision from the local authority and it is obvious that under the circumstances diseased meat or meat prepared under unhygienic conditions is liable to reach the consumer.
- (c) Many farmers bring in meat from their farms for sale on the open market. The local authority cannot prohibit this but is empowered to subject such meat to examination by its duly appointed meat inspector. The local authority has, however, no means of controlling the conditions under which such meat is prepared for marketing and the inspector is moreover considerably handicapped in his work inasmuch as he has no opportunity of examining the animals prior to slaughter nor is he able to make a complete examination of the viscera.

It is obvious that under the prevailing conditions it is easily possible for meat which is diseased or which has been prepared under very unhygienic conditions to reach an urban consumer. The Department has approached the provincial authorities in connection with this matter with a view to securing a more adequate control and inspection of meat supplies, but thus far its efforts have proved abortive. Unless the provincial authorities concerned are prepared to amend their relative ordinances, the difficulties enumerated above are likely to continue.

An attempt has been made at Kroonstad to remedy this undesirable state of affairs. In this municipal area an arrangement has been come to whereby the magistrate refuses to issue a licence in respect of any rural butcher shop or slaughterhouse which in the opinion of the local medical officer of health or district surgeon is not maintaining a satisfactory hygienic standard. This has the effect of preventing to some extent the sale in town of meat which has been produced under unhygienic conditions. But the danger of introducing into the town diseased meat is not eliminated as there is no arrangement for the regular inspection of such meat at the time of slaughtering.

VII. CONCLUSION.

I cannot conclude this Report without a reference to the excellent team work performed by the officers of the Department. Dr. F. C. Willmot the Senior Assistant Health Officer stationed in Capetown has rendered invaluable service over a number of years in the Cape Province. In addition to his already onerous duties he is Chairman of the Union Leprosy Board and also ably represents the Secretary when the latter is absent from Capetown during the Parliamentary Session. Acknowledgment is due to him for the quantity and quality of the work he has rendered without stint. Dr. G. Park Ross at Durban in spite of ill-health concentrated wholeheartedly for the greater part of the year on problems connected with the prevention of malaria in Natal and Zululand and has succeeded in securing the establishment of a large number of local authorities in areas in Natal where the malaria menace cannot be coped with except by communal effort. Acknowledgment is also due to Dr. W. A. Murray, the Senior Assistant Health Officer at Headquarters, Dr. A. J. van der Spuy, Dr. L. Fourie and Dr. F. W. P. Cluver of the inspecting and itinerant staff and to Dr. E. H. Cluver stationed at Johannesburg who one and all have rendered valuable service during the year. To the last-named officer I owe special thanks for his assistance in the preparation of the greater portion of this Report. Dr. D. H. S. Annecke, Medical Inspector (Malaria) stationed at Tzaneen, Dr. P. Allan at Nelspoort, Dr. J. Daneel at Rietfontein, Dr. J. W. de Vos at the Pretoria Leper Institution and Mr. J. A. Macdonald of the Emjanyana Leper Institution, have all brought the work under their charge to a high level of efficiency.

I must allude to the excellent work performed by Drs. Rhodes and Sampson of the Government Laboratories at Capetown and Durban and by the other officers in charge of the various departmental branches and institutions under circumstances of unusual difficulty.

The district surgeons have regarded themselves as members of the public health team and individually and collectively through their Association have been of the greatest possible assistance.

The Government of the Union of South Africa is indebted to Col. P. G. Stock, C.B., C.B.E. of the staff of the Ministry of Health, Whitehall, and formerly Director of Medical Services for the Defence Forces of the Union for acting as its representative on the International Health Office at Paris and I am grateful indeed to him for his full reports on all matters dealt with by that office during the year and at all times for his able presentation of the Department's views.

Finally I must refer to the excellent work performed by Mr. A. de V. Brunt and the members of the administrative and clerical staff under his control. It is certain that were it not for the ungrudging spirit in which everyone in this office works the Department could not cope with its responsibilities.

I have the honour to be,

Sir,

Your obedient servant,

E. N. THORNTON,

Secretary for Public Health and Chief Health Officer.

Department of Public Health,
Union Buildings, Pretoria,
15th September, 1932.

ANNEXURE A.

REPORT ON PLAGUE IN OVAMBOLAND, SOUTH WEST AFRICA,
BY DR. L. FOURIE, ASSISTANT HEALTH OFFICER, UNION
HEALTH DEPARTMENT, DATED 8TH JUNE, 1932.

THE SECRETARY FOR PUBLIC HEALTH,
UNION BUILDINGS,
PRETORIA.

PLAGUE, OVAMBOLAND.

(1) ITINERARY.

In accordance with the instructions contained in your telegram No. 27 of the 24th March last, I left Durban on the 27th March for the purpose of carrying out an investigation into the prevalence of plague in Ovamboland.

I arrived at Windhoek on the 31st March and, after discussing matters with the Secretary for South West Africa and the Medical Officer to the Administration, continued the journey to the railway terminus at Tsumeb by the first available train which left Windhoek on the 3rd April. The journey from Tsumeb onwards was made by the contractor's motor lorry which left at noon on the 5th and reached Ondangua, the seat of the Native Commissioner of Ovamboland, the following afternoon.

On the northward journey, I availed myself of the opportunity of making a hurried survey of the rodent position between Tsumeb and Ondangua, a distance of 180 miles, and found definite evidence of an extensive epizootic among veld rodents during the summer of 1930-31 from a point some 20 miles South of Namutoni northwards into Ovamboland. The survey of the country traversed at night was made on the return journey on the 6th May.

At Ondangua, I found Dr. Hinsbeeck, the Medical Officer to the Administration, who had travelled up by aeroplane, awaiting me.

The first week was devoted entirely to the investigation of the position in the Ondonga district to which it was believed at the time that the outbreak was still confined. The patients in the Finnish Mission Hospital at Onandjokwe and in various kraals were visited and examined, and a rodent survey of the area was made. With the assistance of the Native Commissioner, Mr. C. H. L. Hahn, arrangements were made for the collection of rodents in the various tribal areas for the purpose of identification.

On the 9th April, a visit was paid to Chief Martin of the Ondonga tribe with a view to enlisting his co-operation, especially with regard to the early notification of cases of human plague.

By the 13th April, sufficient information and material had been obtained to remove any doubts which may have existed as to the presence of both human and rodent plague in the Ondonga area.

On the 16th April, a visit was made to Ondjiva in Angola at the invitation of the Portuguese Authorities, and the position in Ovamboland was discussed with, and explained to them. On the 18th April, Dr. Hinsbeeck returned to Windhoek.

Apart from a survey of the other tribal areas between the 27th April and 1st May, the rest of the time was spent in training a rodent inspector, for which authority was obtained from His Honour the Administrator on the 12th April, and in placing anti-plague measures on an active footing.

I left Ondangua on the afternoon of the 5th May on the return journey and arrived at Windhoek on the morning of the 9th May. The whole of the distance of 500 miles was covered by car so as to permit of an inspection being made for signs of rodent mortality in the northern districts.

On the 11th and 12th May, a hurried survey was made of the country between Windhoek and a point 12 miles east of Gobabis on the western border of the Kalahari.

I finally arrived at Durban on the 18th May.

(2) HISTORY OF THE PRESENT OUTBREAK.

On the 28th January last, Dr. van Niekerk, the District Surgeon, reported to the Administration the occurrence of an outbreak of plague in the Ondonga area.

During the preceding 3 or 4 weeks isolated cases of glandular swelling in the groin, accompanied by slight constitutional disturbance, had been observed but, owing to the mildness of the symptoms, the condition was at first looked upon as something in the nature of climatic bubo.

On the 28th January, however, after examining two patients, both of whom were suffering from a painful bubo in the left axilla and marked constitutional symptoms, Dr. van Niekerk came to the conclusion that these cases, as well as those previously seen, were due to plague.

On the 8th February, he reported that the disease was confined to the southern part of the Ondonga area and that up to that time 25 cases, with 5 deaths, had occurred. At the same time the carcass of a gerbille, caught close to his house and apparently healthy, was sent to Dr. Nägelsbach of Tsumeb for examination, and on the 11th the latter reported the presence of organisms, which morphologically were suggestive of *B. pestis* in smears from the spleen. The position was subsequently investigated by Dr. Hinsbeeck whose findings have already been supplied to you and need not be recapitulated.

After arrival at Ondangua, I examined some smears made from buboes by Dr. van Niekerk and found gram-negative, bipolar-staining organisms, which morphologically appeared to be typical of *B. pestis*, to be present in them. The clinical history and symptoms of patients examined by me at the Finnish Mission Hospital at Onandjokwe and at various kraals were typical of bubonic plague, and confirmatory evidence was obtained of a co-existing epizootic of plague among wild rodents.

Up to the middle of April, the outbreak was believed to be confined to Ondonga and the adjoining extreme southern corner of Ukuanyama from which 2 cases had been reported in February. During a visit to the north-western tribes on the 29th and 30th April, it was found, however, to have spread recently to the Ombalantu and Ongandjera areas. Three fresh cases of bubonic plague were seen in Ombalantu and one in Ongandjera.

The area involved at present measures roughly 80 by 120 miles.

According to information obtained from Dr. Salma Rainio and other members of the Finnish Mission, isolated cases began to make their appearance towards the end of November last.

On the 3rd December, a woman, who had been suffering from right and left inguinal buboes for about a week, was admitted to the hospital at Onandjokwe. Four more patients with inguinal or cervical buboes were admitted during December and two of them died. Of three patients, suffering from similar symptoms and admitted during January before plague was suspected, 1 died. This patient had come from Onayena 20 miles south of Ondangua.

At Onayena, Missionary Björkland, who is in charge of the Finnish Mission at that place, informed me that in November a native woman, Taimi Shipneya, took ill with a swelling in the right groin and moved to the kraal of Paulina Angumbe. The latter went down with similar symptoms a few weeks later (early in December) and recovered. Subsequently Timene Sika, an old man living in the same kraal, and Paulina's husband developed the same symptoms and died on the 1st and 11th January respectively. The daughter, who was living in a neighbouring kraal, died from bubonic plague on the 3rd March. With the exception of Timene, all were members of his Mission.

According to Mr. Björkland the disease was also prevalent among the heathen around Onayena during December, the first known death among them being that of Timene on the 1st January.

Up to and including the 5th May, the monthly figures were approximately as follows:—

November, 3; December-January, 12; January, 9; February, 24; March, 17; April, 26; May, 1.

(3) INCIDENCE AND TYPE OF THE DISEASE.

Considerable difficulty was experienced in our endeavours to obtain information as to the incidence of the disease. Most of the cases which had been brought to light were said to be members of, and to have been reported by the Finnish Mission. As to the course of events among the heathen there remained an almost complete lack of information up to the time of my departure.

On the 9th April, a visit was paid by Mr. Hahn and myself to Chief Martin of Ondonga with a view to enlisting his co-operation, especially with regard to the early notification of cases. It was felt that the tribal intelligence system, through which the Chief is, at all times, kept fully informed about events within the tribe, offered the best means of bringing to light cases among the heathen. As the result of a second visit to the Chief by Mr. Hahn, a man was placed at our disposal to facilitate the finding of our way to plague-infected kraals. The discovery of 3 unreported cases in the kraal of Shapopi, one of the Chief's principal headmen, on the 20th April led to another interview with the Chief two days later at Ondangua as the outcome of which a list of 28 deaths from "mouse" disease, the name by which plague has come to be known locally, was furnished to us on the 5th May. The investigation of those deaths was to be proceeded with after my departure.

Excluding the patients enumerated in Martin's list and 5 deaths reported while we were on the way to Tsumeb, the number of cases up to the 5th May was 92 with 21 deaths. Of these, 85, with 20 deaths, occurred in Ondonga, 2 in Ukuanyama, 4 with 1 death, in Ombalantu and 1 in Ongandjera. No enquiries were made from the Chief of the Ukuambi whose kraal was passed at night. No cases, however, had come to the notice of the Catholic Mission, situated some miles to the north of the Chief's kraal, and the rodents in the vicinity appeared to be active and healthy.

According to the scanty information which became available, in nine instances two or more cases occurred in the same kraal. A point of some practical importance is that, as in the 1929-30 outbreak in the Free State, the patients were seldom attacked simultaneously. Usually the first case was followed after an interval of from 12 to 14 days by the second, the subsequent cases occurring at intervals of from 1 to 7 days from each other.

All the cases were of the bubonic type. The age and sex distribution, etc., were as follows:—

Glands Affected.	Men.		Women.		Children (0-25 yrs.).				Total.	
					M.		F.			
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
Inguinal.....	7	1	18	4	13	1	7	3	45	9
Axillary.....	4	1	5	1	4	1	5	2	18	5
Cervical.....	—	—	4	2	4	—	3	—	11	2
Two or more Groups.....	—	—	—	—	—	—	3	3	3	3
Unclassified.....	4	1	4	—	2	—	5	1	15	2
TOTAL.....	15	3	31	7	23	2	23	9	92	21
Case Mortality.....	20 %		22·6 %		8·7 %		39·1 %		12·8 %	

Although, at the outset, the disease is said to have been of a mild ambulant type in a considerable proportion of the cases, most of the fresh cases seen by me during April were acutely ill.

The low case mortality shown by the above figures is partly due to the fact that the actual number of deaths which occurred is not known. On the other hand, it may point to a mild type of infection, or an enhanced resistance to the disease among the Ovambo.

Compared with the mortality from bubonic plague among farm natives during the 1929-30 outbreak in the Orange Free State, the figures are as follows:—

	Orange Free State.			Ovamboland.		
	C.	D.	Case Mortality.	C.	D.	Case Mortality.
0-15 years.....	31	20	64·5	46	10	21·7
Over 15 years.....	45	18	40·0	46	10	21·7
0-15 years—						
Inguinal.....	15	8	53·3	20	4	20
Axillary.....	11	8	72·7	12	6	50
Cervical.....	5	4	80·0	11	2	18·1
Over 15 years—						
Inguinal.....	27	10	37·0	25	5	20
Axillary.....	13	5	38·4	9	2	22·2
Cervical.....	5	3	60·0	4	2	50·0

(4) PHYSICAL FEATURES.

(a) *Ovamboland.*

Ovamboland is a flat, undulating country, situated at an altitude of from 3,400 to 4,000 feet between latitude 17.25 and 18.50 S., and longitude 14 and 17.50 E. It covers an area of 17,000 square miles of which roughly one-third is inhabited. It is bounded on the north by Angola, on the south by the Etosha Pan Game Reserve, on the west by the Kaokoveld and on the east by the north-western Kalahari.

In the north, it is covered with thick belts of sub-tropical vegetation, while in the centre and south the country opens out into large grass plains fringed with bush. Though there are no permanent rivers or lakes, a characteristic feature is the presence of a network of shallow grass-covered watercourses known as oshanas, which become flooded during good rainy seasons and inundate as much as three-fifths of the territory. The surface waters ultimately find their way into four main channels running from north to south and enter the Etosha Pan. In south-eastern Ovamboland, the oshanas are not as numerous or well defined as in the north and north-west, their place being taken by shallow depressions or pans.

After the close of the rainy season towards the end of March or beginning of April, the surface waters recede rapidly, and from the end of July onwards the inhabitants are dependent entirely on dams, waterholes and wells.

The abundance and luxuriant growth of grass and other seed-bearing vegetation in Ovamboland and the Kalahari region furnish a permanent and plentiful supply of food for the indigenous rodents, even in times of drought.

The habitations and fields are situated on low sand-dunes between the oshanas and pans. The surface soil consists of a sandy loam which is rich and fertile and infested with wild rodents. The beds of the oshanas, on the other hand, are of a black, clayey nature and unsuitable for burrowing, except when covered with drift sand as was noted to be the case in some of the main and deeper channels. In the north-western area comparatively few burrows were seen in the large, shallow oshanas, which, in many cases, are a mile or more in width. The intervening mopane-clad dunes were found, however, to be riddled with gerbille burrows.

The spread of rodent plague in the oshana region may possibly, therefore, be less rapid, pursue a less regular course and smoulder for a longer period than on the open plains of Central and Eastern Ovamboland.

(b) *Kaokoveld.*

The Ovamboland plateau is replaced over the greater portion of the Kaokoveld by broken ranges of mountains which are separated from the Atlantic by a narrow strip of Namib Desert. Only the extreme eastern portion of the country is suitable for the rodents which are mainly responsible for the spread of plague.

(5) ROADS.

The only roads are the two main roads from the south, the main roads between the tribal areas and to Angola and the branch roads to the various mission stations. Though sandy and heavy, all the roads are suitable for motor transport, except during good rainy seasons when they may become impassable to all modes of transport.

(6) TRIBES OF OVAMBOLAND.

Under the term "Ovambo" are included the eight kindred tribes which inhabit Ovamboland, viz., the Ondonga, Ukuanyama, Ukuambi, Ombalantu, Ongandjera, Ukualuthi, Onkolonkathi and Eunda. Each tribe speaks a dialect of its own, has its own tribal organization and, in some instances, customs which are not common to the other tribes.

(7) ADMINISTRATION OF TRIBAL AFFAIRS.

Tribal affairs are administered through the chiefs or councils of headmen under the supervision and guidance of the resident Native Commissioner, whose headquarters are at Ondangua. The Ondonga, Ukuambi, Ongandjera and Ukualuthi are ruled by tribal chiefs. Among the remaining tribes, councils of headmen have taken the place of the chieftainship.

The administrative machinery consequently calls for constant attention and the exercise of a great deal of patience on the part of the Administration.

(8) MISSIONS.

Three mission bodies, viz., the Finnish, Roman Catholic and Anglican, are operating in Ovamboland. Only about two-fifths of the people, however, have come under their influence.

(9) HOSPITALS, ETC., AND DISPENSARIES.

The Finnish Mission maintains a central hospital, which is under the charge of Dr. Salma Rainio, at Onandjokwe in Ondonga and district hospitals at Engela in Ukuanyama, Rehoboth in Ongandjera and Tshandi in Ukualuthi.

The Anglican Mission runs a hospital at Ondibo in Ukuanyama.

Small dispensaries are attached to most of the other mission stations.

Grants-in-aid are made by the Administration towards the medical work of the missions.

Owing to the cessation of recruiting for the mines, the post of assistant district surgeon has been abolished temporarily.

The present district surgeon, Dr. van Niekerk, has his headquarters at Ondangua.

Government dispensaries are maintained at Ondangua and at Omafa in Ukuanyama respectively.

(10) POPULATION.

(a) *Ovambo*.

According to a recent local census the population is as follows:—

Ondonga.....	50,000
Ukuanyama.....	45,000
Ukuambi.....	9,000
Ombalantu.....	7,000
Ukualuthi.....	6,000
Ongandjera.....	6,000
Onkolonkathi.....	1,000
Eunda.....	600
TOTAL.....	<u>124,600</u>

(b) *Kaokoveld*.*Population—*

Oorlog's Reserve.....	829
Karuwapa's Reserve.....	426
Kasupi's Reserve.....	378
Outside Reserves.....	4,669
TOTAL.....	<u>6,302</u>

The inhabitants are scattered over an area which is bigger than Ovamboland, but fortunately they are in small compact groups, separated by large, unoccupied stretches of country. The principal settlements are all within reach of motor transport.

The inhabitants are a nomadic, pastoral people who do very little cultivation of the soil.

(11) DENSITY OF POPULATION IN OVAMBOLAND.

The country actually in occupation covers an area of 5,800 square miles. The density of population per square mile of occupied territory is as follows:—

Ukuambi, 12; Ondonga, 15; Ukuanyama, 26; Ombalantu, 27; Ongandjera, 35; Ukualuthi, 35; Onkolonkathi, 83, and Eunda, 150.

The average number of persons per kraal varies from 5 in Eunda to 7 in Ukualuthi, the average for all tribal areas being 6. The number of kraals in Ovamboland is thus approximately 20,766 or 3.6 per square mile.

(12) FOOD SUPPLY.

The nature of the food supply, associated with the primitive mode of living of the people, has an important bearing on the spread of plague from rodent to man in Ovamboland.

The staple food is a hardy, quick-maturing variety of millet, known as mahango, which is stamped and eaten in the form of a dry porridge. Kaffir-corn, though not as drought-resisting as millet, is grown extensively for the purpose of making beer. Among the well-to-do classes it is also eaten as porridge. The beer contains a very small percentage of alcohol and forms an essential constituent of the diet of the people.

Before the planting season, the field is hoed and prepared into small, raised beds in order to allow the flood-water to run off readily and to prevent brack from rising. Planting is done only on the beds. After the crops have ripened, the tops are severed from the stalk, collected and threshed on a specially prepared floor of stamped earth within the field. The corn is stored in top-shaped baskets raised on supports above the ground and placed in a special section of the kraal. During a good season, a well-to-do headman may reap from 300 to 400 bags of corn.

The stalks are tied into bundles and are generally used for the thatching of huts. Among the soorer classes, or in parts where the country has been denuded of timber, they are used for the construction of huts and to take the place of palisades.

In addition to millet and kaffir-corn, crops of beans, pumpkins, melons, groundnuts, etc., are also extensively grown.

The ordinary food supply is supplemented by the fruit of various indigenous fruit trees in which the country is exceptionally rich. Among the most important of these are the ivory palm (omulunga), wild fig (omkuyu), marula (mugongo), omuandi, omnye, omuve and the wild orange (omguni). In former times, palm wine was made from the sap of the ivory palm. The fruit of the marula and omuve enter largely into the dietary of the people and marula beer is a popular, but somewhat intoxicating beverage. Other edible plant foods, such as wild "onions" and "potatoes", various roots and berries, etc., are plentiful during the rainy season.

Though the country is rich in both large and small stock, animals are seldom killed for food. To slaughter a beast is considered a luxury in which only the rich can indulge, and even the latter resort to it only on festive occasions. On the other hand, the hunting of rodents and other small ground animals for food seems to be carried out on a very extensive scale by the youngsters. Small rodents, especially gerbilles, are caught by digging up the burrows and eaten by both children and adults. The resulting excavations are to be seen all over the country. Spring hares are trapped by closing up the burrows with palm leaves a few feet below the surface while the animals are out feeding and then driving them to earth.

On the whole, the people may be said to be in a prosperous condition. Even in years with an average rainfall, the harvests are plentiful enough to supply the needs of the population, and the pastures sufficient to keep the stock in good condition. The people, however, are extremely primitive and very improvident in their habits, and in times of prolonged or severe droughts, as happened in 1914-15 and again in 1929-30, famine is very liable to occur. Only the middle and rich classes store up grain from season to season and generally have in reserve a two years' supply.

There is no export trade in grain or other foodstuffs from Ovamboland to Angola or to other parts of South West Africa.

(13) METEOROLOGICAL CONDITIONS.

The rainy season extends from the beginning of October to the middle of April. The average annual rainfall is about 16 inches. The available figures from the recording stations at Ondangua and Tshandi (Ukualuthi) since 1915 are as follows:—

	Ondangua. (Ondonga.)	Tshandi. (Ukualuthi.)
	Inches.	Inches.
1915-16.....	11·0	13·8
1916-17.....	38·6	25·1
1917-18.....	19·5	No record.
1918-19.....	10·9	8·3
1919-20.....	13·6	No record.
1920-21.....	31·1	31·7
1921-22.....	6·9	12·5
1922-23.....	10·9	7·1 (up to end January only).
1923-24.....	18·7	11·1 (11 months).
1924-25.....	32·3	27·2
1925-26.....	11·0	17·2
1926-27.....	12·9	19·3
1927-28.....	14·7	7·7
1928-29.....	7·8	12·4
1929-30.....	6·2	8·3
1930-31.....	19·4	13·6
1931-32.....	9·0	6·4

Thermometric observations are made only at Ondangua, but the available data, with the exception of those for the 1930-31 season, are very scanty and incomplete. The figures for the 12 months ending the 30th June, 1931, are as follows:—

	Rainfall.	Temperature.			Humidity.	Saturation Deficiency.
		Mean Maximum.	Mean Minimum.	Mean.	%	Inch.
1930.						
July.....	—	80·3	43·6	61·9	44	·204
August.....	—	84·8	46·0	65·4	42	·229
September.....	—	90·6	51·0	70·8	44	·280
October.....	·15	95·5	61·5	78·5	39	·432
November.....	1·05	94·9	66·8	80·9	46	·429
December.....	2·30	93·7	66·8	80·3	38	·500
1931.						
January.....	3·10	90·6	67·8	79·2	62	·277
February.....	3·35	89·9	68·5	79·2	67	·261
March.....	7·25	86·1	65·3	75·7	77	·164
April.....	2·20	85·8	61·1	73·4	63	·230
May.....	—	86·6	54·2	70·4	50	·265
June.....	—	77·7	45·4	61·6	50	·183

Mean temperatures above 80° or below 50° F. and a saturation deficiency of over .3 of an inch have been found to be unfavourable for the multiplication of fleas and hence for the continuance of a plague epidemic.

The above figures show the mean temperatures to have ranged from 60° to 80° F. and the saturation deficiency to have exceeded .3 of an inch only in October, November and December. According to both European and native residents, the 1930-31 season may be looked upon as representing a good average year. Hence, assuming that this view is correct, it may be concluded that the range of mean temperatures under normal circumstances would favour the continuance of plague in Ovamboland throughout the year. On the other hand, the saturation deficiency of over .3 of an inch during October, November and December would operate against an outbreak during these months.

During the past season, the rains started in November, and in December there was a fall of 2.9 inches and a saturation deficiency of less than .3 of an inch (.277 in.).

The appearance of the first cases of plague coincided more or less with the appearance of the rains. It seems likely, therefore, that when rains set in early and are distributed evenly over the season, as was the case in 1916-7, 1919-20, 1920-21, 1924-25 and 1927-28, plague may be prevalent throughout the year.

(14) MAMMAL SURVEY OF THE TERRITORY.

At the request of the Administration in 1923, a mammal survey, which was being made by Captain Shortridge on behalf of the British and King-williamstown Museums in Damaraland, was extended and ultimately covered the whole of the territory. As the existence of enzootic plague in the Union had been definitely established two years previously, it was felt that, in view of the possible spread of the disease northwards, immediate steps should be taken to collect information about the rodents of the country.

Four collecting expeditions, towards the cost of which the Administration contributed in a generous manner, were made by Captain Shortridge, namely, the first to Ovamboland and the Kunene River, the second to Gobabis District, Eastern Damaraland, the third to the Kaokoveld and the fourth and final one to the Okavango region. The reports by the late Mr. Oldfield Thomas of the British Museum on the mammals collected were published in the P.Z.S. for 1925, 1926, 1927 and 1929. The field notes and accounts of habits written by Captain Shortridge were included in some of Thomas' papers, but unfortunately not in the one on Ovamboland. The report on the Okavango region has not appeared yet. It was necessary, therefore, to make a rapid survey of the rodents which are to be met with in and around the kraals in the various tribal areas.

A work on the mammals of South West Africa is in course of preparation by Captain Shortridge.

(15) DISTRIBUTION IN SOUTH WEST AFRICA OF SMALL MAMMALS ASSOCIATED WITH THE SPREAD OF PLAGUE IN THE UNION.

The following list is based on the reports of Oldfield Thomas, supplemented by personal observations in South West Africa:—

- (a) ORDER: *Rodentia*.
 Sub-family: *Gerbillinae*.
 Genus: *Taterona*.
 Species: *T. schinzi* and *T. joanae*.

Distribution: *T. schinzi*—exceedingly numerous throughout sandy portion of territory along eastern border and extending northwards through Ovamboland into Kaokoveld and Angola. In Kaokoveld its range localized by presence of mountains.

T. joanae—a new species from Ovamboland; closely resembles *T. schinzi* in size and general characters.

- Genus: *Desmodillus*.
 Species: *Desmodillus auricularis*.
 Sub-species: *D. a. pudicus*.

Distribution: Very wide; main habitat in central parts of Damaraland and Namaqualand where, in suitable localities, it extends eastwards across Bechuanaland border; northern limit in Kaokoveld and Ovamboland close to Portuguese border; western limit in Kuiseb valley around Walvis Bay and foot of Kaokoveld mountains; numerous in favourable localities and overlapped by *T. schinzi*. Not recorded in the mammal survey of Ovamboland by Shortridge.

- Genus: *Gerbillus*.
 Species: *G. vallinus*—along dry river beds in Namaqualand.
G. swalius—same range as *T. schinzi*.
 Sub-species: *G.s. oralis*—in Kuiseb River basin around Walvis Bay.
G.s. leucanthus—the lighter coloured Ovamboland form.

Very plentiful in sandy regions.

- (b) Sub-family: *Murinae*.
 Genus: *Mastomys*.
 Species: *M. coucha*.
 Sub-species: *M.c. bradfieldi*—Kaokoveld and Damaraland forms.

Distribution: Same as *T. schinzi*.

Genus: *Rhabdomys*.
 Species: *R. pumilio*.
 Sub-species: *R.p. bechuanae*—Eastern Damaraland.
R.p. griquae—elsewhere in territory.

Distribution: Universal, including Kuiseb River basin.
 Very plentiful in certain localities.

Genus: *Leggada*.
 Species: *L. bella*.
 Sub-species: *L. bella induta*.
 Wide distribution, but comparatively scarce.

(c) Sub-family: *Dendromyinae*.
 Genus: *Malacothrix*.
 Species: *M. egeria*.

Distribution: Same as *T. schinzi* and *Mastomys*. Although only the single specimen of the Shortridge collection has been described from South West Africa, I found *Malacothrix* to be plentiful in Ovamboland and, as was expected, it is well known to both Europeans and natives in Eastern Damaraland.

Genus: *Steatomys*.
 Species: *S. swalius*.
 Sub-species: *S.s. Umbratus*.

Distribution: Same as *Malacothrix*, but not quite as plentiful.

Genus: *Saccostomus*.
 Species: *S. damarensis*.
S. pagei.
S. anderssoni.

Distribution: One or other of above species reported from all regions, except the coast littoral. Fairly plentiful in sandy regions, including Ovamboland.

(d) Sub-family: *Myotinae*.
 Genus: *Liotomys*.
 Species: *L. littledalei*.

Distribution: Confined to Namaqualand with northern limit in vicinity of Mariental.

Habits: Burrows situated at foot of small bush or scrub, but, as a rule, not covered with a collection of sticks or nest as in the Union.

(e) Sub-family: *Cricetinae*.
 Genus: *Mystromys*—not reported from South West Africa up to present.

(f) Family: *Sciuridae*.
 Genus: *Geosciurus*.
 Species: *G. princeps*—Kaokoveld.
 Sub-species: *G. capensis namaquensis*—occurs elsewhere in South West Africa.

Distribution: Wide range in territory, but plentiful only in favourite localities; occurs in Ovamboland though not represented in the Shortridge collection.

(g) Family: *Leporidae*.
 Genus: *Lepus*.
 Species: *L. capensis*.
 Sub-species: *L.c. herero*—Ovamboland and Kunene River.
L.c. narranus—Berseba and Kuiseb River, Namaqualand.
L.c. mandatus—Central Great Namaqualand.
 Genus: *Pronolagus*.
 Species: *P. crassicaudatus*.
P. caucinus.

Distribution: Universal and very plentiful, as a rule, in most localities.

(h) Family: *Bathyergidae*.
 Genus: *Cryptomys*.
 Species: *C. lugardi*.
C. damarensis.

Distribution: Confined to sandy portions of territory and much the same as that of *T. schinzi*.

ORDER: *Carnivora*.
 Family: *Viverridae*.
 Genus: *Suricata*.
 Species: *S.s. hahni*.

Distribution: Of a local nature in suitable localities and confined to Namaqualand and Damaraland. Plentiful in some parts.

Genus: *Cynictis*.
 Species: *C. bradfieldi*.
C.b. cinderella.

Distribution: Over whole territory and very plentiful in some parts.

The size and general characters of South West African mammals are, generally speaking, the same as in the Union. The coloration, however, is generally lighter and shows a tendency to grey. In many instances also, owing to the nature of the food supply, their habits differ considerably from those displayed in the Union. For example, in Ovamboland, *T. schinzi* exists mainly on grass and seeds. Accumulations of stalks and fragments of grass and other seeds are not infrequently seen at the entrance of the burrows, especially when the latter are situated some distance from the feeding grounds. The signs of scratching for food, which are invariably present around the burrows of *T. lobengula*, are seen only in the inhabited areas and after the pastures have been denuded by stock. Similarly, after local migration into the oshanas or pans during the dry season, the paths leading into the dense grass for 60 to 80 yards from the burrows are strewn with stalks and closely resemble those made by *O. irroratus*.

(16) LOCAL SPECIES WHICH MAY POSSIBLY PARTICIPATE IN THE SPREAD OF
 PLAGUE IN SOUTH WEST AFRICA.

Apart from the animals enumerated above, a few local genera may possibly play a part in the spread of plague infection in the territory.

The genus *Petromys* with two species embraces the rock rat of South West Africa, belonging to the sub-order *Histricomorpha*. It has a wide distribution extending over the central highlands from the Orange to the Kunene River. In the crevices of the rocks among which it lives are to be seen large accumulations of sticks or "nests". Its colour varies from grizzled grey to dark brown and the fur is soft and rather long. The tail is bushy, rather like that of the dormouse. The measurements of *P. cunealis*, which is somewhat larger than *P. typicus*, are:—

Head and body, 180 mm.; tail, 175; hind foot, 39; ear, 14.

The incisors are yellow and not grooved. The shape of the skull is characterized by the pronounced flattening of the frontal region.

P. typicus is met with in Namaqualand and Damaraland and *P. cunealis* in the Kaokoveld.

At Windhoek *Petromys* is to be seen living in close contact with striped mice and occasionally with house mice among rocks and accumulations of stone around the dwellings situated on the hillsides. It is not known whether it is infested with fleas or not.

The genus *Aethomys* is represented by two species, *Ae. namaquensis* and *Ae. chrysophilus*, which also have a wide distribution.

The colour above is pale lined buffy and the under surface white with slaty bases to the hairs, except in the sub-species *Ae. n. siccatus* from the Kunene River and *Ae. n. calarius* and *Ae. c. imago* from the Gobabis District in which the bellies are pure white. The measurements are:—

Ae. n. siccatus: Head and body, 116; tail, 172; hind foot, 26.5; ear, 20.

Ae. c. imago: Head and body, 147; tail, 174; hind foot, 29; ear, 20.

According to Shortridge *Ae. c. imago* is a bush rat which is comparatively plentiful and widely distributed in Gobabis District. It frequents patches of undergrowth in the vicinity of tree belts that fringe dry watercourses, sometimes topping the bushes over the burrows with rain or sun shelters of dry grass. He found *Ae. n. calarius* to be extremely plentiful towards the Bechuanaland border where, possibly owing to overcrowding of the normal habitat among rocks, it has spread in many parts to the open sand veld and lives in conspicuous, large dome-shaped nests of grass sticks. In these nests he not infrequently found stray multimammate mice.

As the sand veld is infested with *Taterona*, *Aethomys* lives in very close association with the two species which are of most importance in the spread

of plague in South West Africa. Among the fleas found on it are two species that are known to be capable of transmitting plague from rodent to rodent, viz., *C. canis* and *X. brasiliensis*.

(17) DISTRIBUTION OF *R. r. alexandriaus* AND *M. musculus* IN SOUTH WEST AFRICA.

The black rat is practically confined to the ports. At Luderitz it is said to have obtained a firm footing in the timber yards, etc. As many as 50 to 60 are caught at a time on railway premises during the periodical visits of the railway ratcatcher.

At Walvis Bay, it is found mainly in stores in which the sub-floor space has been boarded in. The sheds on the wharf are rat-proof and periodical trapping is resorted to in them.

The goods sheds in Swakopmund, as also certain premises in the town, are stated to afford harbourage.

Further inland the climatic conditions are unfavourable to rats and only isolated specimens are caught occasionally on the railway premises at Usakos, Karibib and Windhoek.

The house mouse, on the other hand, appears to have established itself firmly in houses and stores both in the townships and at railway stations and sidings. I was informed by Mr. Louw, the railway ratcatcher, that in 1928 he had destroyed 1,000 house mice in a disused shed, since demolished, at Kalkrand Siding.

(18) ECTOPARASITES FOUND ON THE SMALL MAMMALS OF THE TERRITORY.

Apart from the identification by Dr. Ingram of a collection of fleas, made at my request by Captain Shortridge during his mammal survey of eastern Damaraland in 1925, no work has been done in South West Africa on this subject. It was hoped at the time that he would be able to continue the work during subsequent expeditions, but owing to lack of time, it had to be abandoned.

The fleas were collected during October and November in the Gobabis District on the western Kalahari border. Among them were identified 4 of the 8 species that have been shown capable of transmitting plague from rodent to rodent in South Africa, viz.:—

<i>Flea.</i>	<i>Host.</i>
<i>Ctenocephalus canis</i>	<i>Genetta felina</i> , <i>Aethomys namaquensis calarius</i> , <i>Ictonyx striats</i> , <i>Geosciurus capensis nama-</i> <i>quensis</i> , <i>Mungos mungo grisonax</i> .
<i>Dinopsylla lypusus</i>	<i>Elephantulus intufti</i> , <i>Thallomys damarensis</i> , <i>Taterona schinzi</i> , <i>Ochromys woosnami</i> , <i>Mas-</i> <i>tomys coucha bradfieldi</i> .
<i>Xenopsylla eridos</i>	<i>Lepus saxatillis</i> , <i>Rhabdomys pumilio griquae</i> , <i>Saccostomys anderssoni</i> , <i>Mastomys coucha</i> <i>bradfieldi</i> , <i>Taterona schinzi</i> , <i>Desmodillns</i> <i>auricularis pudicus</i> .
<i>Xenopsylla brasiliensis</i> ...	<i>Aethomys namaquensis calarius</i> , <i>Thallomys</i> <i>damarensis</i> , <i>Aethomys chrysophilus imago</i> , <i>Mastomys coucha bradfieldi</i> , ? <i>Graphiurus</i> .

D. lypusus and *X. eridos* were found on the same host in *Mastomys* and *Ochromys*, *D. lypusus* and *X. brasiliensis* in *Thallomys* and *Taterona* and *C. canis* and *X. brasiliensis* in *Aethomys*.

The fleas among the ectoparasites collected from small mammals during my visit to Ovamboland have been identified by Mr. De Meillon of the South African Institute for Medical Research. They were found to consist of only 2 species, namely, *Xenopsylla eridos* and *Echinophaga gallinaceus*. With a single exception *X. eridos* was the only species found on rodents. In this instance both species were identified among fleas collected from *T. schinzi* in the Ombalantu area, but it is probable that fleas from other animals had been placed in the same container. The fleas obtained from cats and dogs in Ovambo kraals and elsewhere were found to consist entirely of *E. gallinaceus*.

Fleas are seldom complained of in dwellings or outhouses in South West Africa. Very few are, as a rule, found on domestic animals outside the native settlements. The greatest number caught on any single rodent during the

recent survey in Ovamboland was four. Six *X. eridos* were collected, however, from the carcass of a gerbille found dead from plague in a burrow at Ondangua on the 13th April.

Arrangements have been made for the collection and identification of the ectoparasites met with on small mammals and in their burrows, with a view to determining the distribution and seasonal prevalence of the various species.

(19) BRIEF DESCRIPTION OF AN OVAMBOLAND KRAAL.

In Ovamboland the contact between man and the various species involved in the spread of plague is of a much closer nature than in other parts of the territory. The primitive habits of the people and the waste associated with the production, collection, storage, and preparation of the various articles of food, serve as a constant attraction to rodents to take up their abode in and around kraals. Among them are included, unfortunately, the species which have mainly been responsible for the spread and perpetuation of plague.

To make the position clear it is necessary to give a brief description of the kraal and its surroundings.

The kraal is always situated at the edge or in the midst of the cornfield. The latter is, as a rule, surrounded by a thorn fence which, at the entrance to the kraal, is continued up to the outer palisade to form a pathway for the cattle.

The kraal is more or less circular in outline and laid out on definite lines by means of wooden palisades or by partitions of brushwood or mahango stalks planted into the ground. Kraals vary in diameter from 15 to 80 or more yards. In the larger ones separate living and sleeping accommodation is provided for the kraal head, his wives, attendants, certain relatives, visitors, etc., each unit consisting of a small hut and yard surrounded by a circular palisade or partition and having one or more entrances. The various units are separated from each other by an intricate maze of passages. Small circular shelters, with open sides and thatched, umbrella-shaped roofs resting on wooden supports, are provided in different sections of the kraal as a protection against sun and rain. The floors of the shelters are formed by the ordinary loose soil on which the kraal stands. The sleeping huts are of similar design and shape, but have floors of stamped earth and walls of timber planted into the ground and plastered with mud internally. Among the poor, the huts are frequently constructed entirely of mahango stalks.

The huts and shelters are from 4 to $5\frac{1}{2}$ ft. in height and 8 to $12\frac{1}{2}$ ft. in diameter. The walls of the sleeping huts seldom exceed 3 feet in height and the entrance consists of a small opening about 2 ft. wide. Fortunately, for inspection and disinfection purposes, the roof can be lifted up or placed aside easily.

Even in the smaller kraals separate units are provided for the stamping of corn, storage of cooking utensils, pots, milk calabashes, flour and other food-stuffs and brewing of beer. The cattle pens and granary are also situated within the kraal.

Among mission natives the European type of hut with mud walls and thatched roof is sometimes met with.

Dogs live in intimate association with the kraal inmates. Not being allowed to enter the sleeping huts, they generally take cover in a dilapidated hut near the entrance of the kraal. They are frequently infested with fleas.

(20) PLAGUE RODENTS FOUND IN AND AROUND OVAMBO KRAALS.

(a) *T. schinzi*—burrows are always to be seen in the fence around the cornfield and sometimes along the outer palisade, especially in the vicinity of the stamping floor and the corn-bins. While no burrows were actually seen in the kraal, there can be no doubt about gerbilles entering the kraal at night in search of food. In a plague-infected kraal near Ondangua, two mummified carcasses were dug up from a burrow situated at the junction of the fence with the outer palisade and about 6 ft. away from the hut in which mahango flour was kept.

(b) *Mastomys*—the multimammate mouse is virtually the domestic rat of Ovamboland. Burrows were found in the sleeping, store, beer and other huts, along the dividing partitions around shelters and huts and underneath corn-bins when resting on, or close to the ground. The manner in which the brush-wood and mahango stalk partitions are planted into the ground offers excellent and well sheltered runs from place to place. It is also met

with in the fences and under scrub outside the kraal. It is said to cause considerable damage, evidence of which was found in a good many of the kraals visited, by gnawing holes into the corn-baskets. It is generally referred to as the "kraal mouse".

(c) *Rhabdomys*—the striped mouse is not met with in the Ombalantu, Eunda and Onkolonkathi areas. In the other districts it is very numerous in the fences around the cornfields and adjoining the palisades. Burrows are sometimes made in the kraal and in one instance its nest was found in a mahango partition. Dead animals have been found recently in many of the kraals.

(d) *Gerbillus*—the burrows are found singly on the raised beds of the cornfield and also in the open and under scrub. Like *Malacothrix* it is in the habit of closing up the entrance to its burrow. Dead carcasses have been found in kraals during the course of the present epizootic.

(e) *Malacothrix*—most of the 60 odd specimens collected during my stay were dug up from the bank surrounding the threshing floor. In parts which are still free from plague, they are frequently seen on the road while travelling at night. Several also were caught by means of a hand torch in the vicinity of fields. The finding of carcasses in kraals has not been reported up to the present. They are, however, certain to visit the cattle kraals at night in search of the seeds in the dung.

(f) *Saccostomus*—burrows have been found in the outer palisade and the animals dug out from them.

(g) *Desmodillus auricularis* probably occurs in very close proximity to kraals in Ongandjera and other localities infested by it.

In no instance was evidence found of the harbourage of rodents in the roofs of huts or of shelters.

(21) PLAGUE RODENTS FOUND LIVING CLOSE TO DWELLINGS IN OTHER PARTS OF TERRITORY.

In the gerbille-infested areas of the occupied territory, numerous burrows were invariably observed in close proximity to all the farm houses which were passed on the road. In some instances they were only a few yards away from the dwelling-house.

In and around Gobabis quite ninety per cent. of the burrows, some of which were situated on open spaces and between dwellings in the township, were found to have been deserted for a year or more.

On the return journey from Windhoek large numbers of active burrows were seen at every station and siding in the Rehoboth District. The part through which the railway passes in that district is a direct off-shoot from the Kalahari and is sure to be affected sooner or later by any epizootic in the latter region.

Fortunately the multimammate mouse, the most important intermediary between wild rodents and man, is not met with in those parts of Damaraland and Namaqualand which are infested by the Namaqua gerbille alone, and the house mouse, the next in importance, is said to be confined mainly to the railway line and urban areas. In the sand-veld, on the other hand, agriculture is not carried out on a large enough scale to attract, to any extent, the multimammate from its very abundant, natural food supply to human dwellings. The climatic conditions also are not as favourable for the spread of human plague as in Ovamboland. It is probable, therefore, that any outbreaks on farms in the rural areas will be of an isolated nature.

(22) EPIZOOTIC OF PLAGUE AMONG WILD RODENTS IN OVAMBOLAND.

During the journey northward on the 3rd April, definite signs of an extensive epizootic among *Taterona* gerbilles were found as soon as gerbille infested country was reached in the vicinity of the Etosha Pan. Quite ninety per cent. of the burrows were observed to be deserted. That this had taken place some time before the autumn of last year was shown, among other things, by the accumulation of old leaves in the burrows. The enlarged entrances, where natural enemies had dug after carcasses within the burrows, were similarly clogged up with dried-out leaves. Here and there on the sand-dunes between Namutoni and Osohama it was noticed that old burrows were being re-opened and that the animals were commencing to breed up again.

After the inhabited area was entered, it soon became evident that the epizootic was still smouldering, patches of recently deserted burrows being found to alternate with patches of apparently normal activity.

On the 10th April, spleen smears and cultures were made from 2 multimammate mice, one of which (No. 1) had been found dead that morning in the hut of patient No. 52 and the other (No. 2) in the cornfield of the same kraal. On the 11th, smears and cultures were taken from a striped mouse (No. 3) found dead in the same kraal. The post-mortem appearances in these mice were those of a haemorrhagic septicaemia and the smears showed gram-negative, bi-polar staining organisms which appeared to be identical with *B. pestis*.

The cultures were despatched to the Union on the 12th April for the necessary biological tests and the results have proved the epizootic to be due to plague.

Two more striped mice, in a highly decomposed state, were brought from the same kraal on the 12th April, but, as sufficient material had already been obtained for purposes of diagnosis, it was decided to investigate burrows in which plague appeared to be active still.

On the 13th April, work was started on burrows in the Government Reserve at Ondangua. In the first three which were dug up only lizards were found, although a few spoors of mice were to be seen about the entrances. In the fourth, the carcass of a female *T. schinzi* (No. 4), still showing well marked post-mortem rigidity, was found about 10 ft. from the entrance close to the nest containing 4 newly born young. Smears and cultures were made from the spleen and heart blood, and a multimammate mouse (No. 5) scarified with material from the spleen. The post-mortem findings were similar to those obtained in the mice examined on the 10th and 11th.

The multimammate mouse (No. 5) died on the 15th (about 60 hours after scarification). The post-mortem appearances and the presence of plague-like organisms in smears from the spleen and heart blood were again strongly suggestive of plague. Cultures from the spleen, along with those obtained from No. 4, were forwarded to the South African Institute for Medical Research on the 16th. The subsequent investigation of this material showed that the animals had died from plague, and thus confirmed the existence of plague infection among wild rodents in Ovamboland.

Before leaving for the Onayena area on the 20th April, I requested Dr. van Niekerk to inoculate subcutaneously a female *T. schinzi* with gland juice from patient No. 52 who was suffering from a L.I. Bubo, accompanied by pronounced constitutional symptoms. This was done in the afternoon and the animal (No. 6) died on the 24th. On the 28th April, a multimammate mouse (No. 7) was inoculated subcutaneously with a culture from the spleen of No. 6 and died 20 hours later. Biological tests, with the cultures made from the spleens of these two animals, have definitely established that the outbreak in Ovamboland is one of bubonic plague.

(23) ORIGIN AND COURSE OF EPIZOOTIC.

According to the monthly reports of Mr. Hahn to the Administration, manifestations of some unusual occurrence among veld mice first became evident during October last. In the report for that month, reference is made to a plague of small birds and veld mice in Ovamboland. In November, he reported that the birds have disappeared, but the mice were still plentiful. No mention is made of the subject in the subsequent reports.

Mr. Hahn, however, informed me that towards the end of January he had noticed a distinct diminution in the number of veld mice, particularly while travelling at night, and that Mrs. Hahn had found dead mice in the storeroom during February. According to information obtained from Native sources the finding of dead mice in kraals coincided more or less with the first appearance of cases of human plague.

The evidence obtained in the field definitely points to the wave of infection having entered South-eastern Ondonga about 12 months ago and having travelled, apparently at a rapid rate, along the main sand-dunes in the first instance. Subsequently a gradual spread outwards took place on to the smaller elevations on the plains where it is still smouldering. The direction of spread is towards the north and north-west.

The survey of the other tribal areas shows that the line of advance has reached the Angola border towards the north, while towards the north-west spread has taken place on a narrow front along some of the dunes running northward through the eastern portions of the Ongandjera and Ombalantu areas. No evidence of mortality was present among the rodents of the Eunda, Onkolonkathi and Ukualuthi areas.

Owing to the high wind which was blowing and the looseness of the surface sand, it was impossible to judge whether the burrows around Rehoboth on the Ongandjera flats showed signs of mortality or not.

Further south in the territory, unmistakable evidence of severe mortality among gerbilles over an extensive area was found after my return from Ovamboland. In the country infested with Namaqua gerbille between Tsumeb and Windhoek, most of the burrows, though numerous in favourable localities only, showed signs of having been deserted for about a year.

On the dunes to the east of Gobabis the gerbille burrows were found to have been deserted some time prior to the rainy season of 1930-31. The burrows in the open have been effaced almost completely, being represented only by depressions in the ground, and many of those in sheltered positions under bushes and scrub still contain stools of grass from that season. In some localities the animals are becoming active again and are evidently increasing in numbers. Similar evidence of a subsequent spread westwards was observed along the main road between Windhoek and Gobabis.

All the indications, therefore, point to a wave of infection from the south having spread northwards through the Kalahari during 1930 and 1931. In this connection it should be borne in mind that a human outbreak associated with mortality among wild rodents occurred as far north as Daniel's Kuil in the Barkly West district, roughly 500 miles from Gobabis as the crow flies, in December, 1929. Ovamboland is about 350 miles to the north-west of Gobabis. The dune formation of the Kalahari extends uninterruptedly into Ovamboland and, being heavily infested with *Taterona* gerbilles, is pre-eminently favourable for the rapid spread of rodent plague, which, in the Union, has been known, in some instances, to have advanced at the rate of 300 odd miles in one month. In November, 1930, while in search of a suitable locality for conducting experiments with De Aar disease, Mr. Powell, late Chief Rodent Inspector of the Department, found that an extensive epizootic had occurred during the preceding 18 months among gerbilles in the northern Cape Province, including the Districts of Barkly West, Kuruman, Vryburg and Mafeking. I may add that as long ago as 1925, on the conclusion of the mammal survey of eastern Damaraland and Ovamboland, it was realized in South West Africa that the Kalahari offered the most likely and probably the only route for the extension of an epizootic of plague from the Union and that, in such event, the Ovambo would suffer most.

(24) LOCAL VIEW AS TO ORIGIN OF THE PRESENT OUTBREAK.

The prevailing and generally accepted view in South West Africa is that infection was introduced through mealie meal imported from the Union during the famine period of 1929-30.

According to the Director of Irrigation the supplies sent to Ovamboland during 1929 were derived solely from mealie meal ground in Windhoek.

During 1930, 15,227 bags of mealie meal were imported from the Union, 3,000 bags of millet and approximately 200 of mealies from Angola. The supply from Angola was distributed mainly among the Ukuanyama. With the exception of 30 bags to Ongandjera and 40 to Eunda, all the meal from the Union was distributed among the Ondonga.

Of the imports from the Union, one consignment of 500 bags is said to have come from Wolwehoek, Orange Free State, and the rest mainly from Maitland, Johannesburg and Pietersburg, i.e. from centres which are still free from plague infection.

Both human and rodent plague were prevalent in the Wolwehoek District during the 1929-30 season. From personal knowledge of the 1929-30 outbreak in the Orange Free State, I am in a position to state, however, that no case of infection from the handling of infected grain occurred on any mills or railway stations in the vicinity of Wolwehoek or elsewhere in the Orange Free State during that period.

In connection with the export of mealie meal to South West Africa, it is exceedingly unlikely that any rodent or flea would have survived the handling involved in the transport from farm to mill, mill to railway, transshipment from broad to narrow gauge line at Usakos and subsequently at railhead and at Ondangua. As far as I was able to ascertain no live or dead rodents were observed by any of the persons who handled the grain in South West Africa. Ninety-nine per cent. of it was dumped into a store at Ondangua and issued from there to various district depots. A staff consisting of 1 European and 4 natives was constantly employed in the store, and at no time were any sick or dead rodents found by them, nor was there any case of illness among them.

In South West Africa, the view as to the origin of the outbreak in the spread of rodent plague northwards from the Union is dismissed as untenable for the reason that no outbreaks have occurred in the districts through which the epizootic must have passed in its progress towards Ovamboland. Consideration of all the factors involved in the epidemiology of plague in South Africa shows conclusively, however, that such outbreaks do not necessarily follow every plague epizootic. In any case very little is known of the factors which might come into play in determining outbreaks in the rural areas of South West Africa.

(25) MIGRATION OF VELD RODENTS.

Reference has been made to the migration of rodents during the dry season from the sand-dunes into the oshanas. In some instances practically all burrows on a comparatively narrow dune were observed to have been deserted for some time, while those in the adjacent oshana appeared to be active still.

In the plague-infected parts of the Ondonga District, it was very noticeable that while the disease was still smouldering on the open plains, the burrows on the dunes or under scrub on high ground bore evidence of having been deserted 4 or 6 months previously. The question as to whether this was due to migration or a wave of plague infection was difficult to solve in that district as plague was still active in parts.

During the visit to the north-western tribes, great activity was observed in suitable localities on low-lying ground as well as on the adjoining dunes along the road through Ukuambi to Ombalantu.

On the outskirts of the inhabited area in Ombalantu, the burrows on one or two narrow dunes appeared to have been deserted for some months, but in the neighbouring oshana activity was to all intents and purposes quite normal. At the official hut, erected by Mr. Hahn a little further on, all the burrows under the scrub, with one or two exceptions, had also been deserted for some time. It was at first thought that the gerbilles may have migrated on account of the undergrowth around the palm and other bush having been cleared away. The following morning 5 cases of undoubted bubonic plague were discovered. The affected huts were situated either on main dunes or on off-shoots of dunes—as the country is level and undulating, it was difficult to determine which of the two—and the burrows around them had been deserted for some months.

Further west between Onkolonkathi and Ukualuthi, there was great activity both on the dunes and in the depressions. No further evidence of mortality was found, except on some large dunes midway between Ongandjera and Ukuambi, on which, however, the animals showed signs of increasing in numbers again.

From the above it seems reasonable to conclude that:—

- (1) Migration from dune to neighbouring depression does not take place as a mass migration, but is participated in only by the animals on the edge of the dune, i.e. it is of a strictly local nature; those on the dune apparently spread out into the burrows deserted by the former.
- (2) A primary wave of infection travels with considerable rapidity, in Ovamboland at all events, along the dune and its main off-shoots, the animals in the oshanas or adjoining plains becoming subsequently infected by a secondary spread outwards some time after the primary wave has passed.
- (3) Desertion of all, or a majority of burrows on a dune indicates that a wave of infection has passed along the dune, no matter whether the animals in the neighbouring depressions show normal activity or not.
- (4) The first outbreaks are likely to occur in the kraals situated on dunes or their off-shoots.

(26) MORTALITY AMONG DOMESTIC RODENTS.

The outbreaks were invariably associated with a concurrent mortality among "kraal" rodents. Among those reported to have been found dead in and around kraals are gerbilles, gerbillus, multimammate and striped mice.

Infection would appear to have been contracted, without exception, within the kraal. In no instance was evidence obtained of infection in the veld or from the eating of diseased rodents.

The mortality among domestic rodents was not confined to native kraals only. In the old mission buildings, occupied by the officials at Ondangua, dried multimammate carcasses were found in Mrs. Hahn's storeroom next to her bedroom, in the quarters vacated by an official some time ago and in the dispensary.

The mission buildings in Ovamboland are all of uniform type with thatched roof, floors of stamped earth covered with linoleum or tarred felt and ceilings composed of split poles covered on top with a layer of mud (brandsolder). The ceiling is covered below with palm mats which sag and leave harbourage for rodents.

During the disinfestation of the premises at Ondangua, it was found that multimammate mice are in the habit of burrowing into the floor underneath the covering, the exits being hardly perceptible. They are said also to find their way into the space underneath the ceiling. It seems very necessary, therefore, that as a precautionary measure European dwellings and outbuildings should be provided with concrete floors, the concrete to be carried up the walls for about 6 inches, and that the ceilings should be made rodent-proof.

Both at the Government and at the mission stations, evidence of infestation of one or more of the buildings with multimammate mice was invariably found, and numerous deserted gerbille burrows were observed around and between dwellings and outhouses. It is essential that all burrows within a radius of at least one quarter of a mile and whether occupied or not, be gassed with cyanodust and closed up, and that subsequent re-occupation be prevented by the prompt gassing of such as may show signs of renewed activity.

(27) DIFFICULTIES IN CONNECTION WITH THE NOTIFICATION OF CASES.

The heathen form the bulk of the population and are still in the habit of resorting to their witch doctors (ongangas) and of avoiding European aid in the case of sickness as much as possible. The result is that while cases of plague among Christians are reported by the missions, those occurring among the heathen are mostly hidden.

The chief is at all times kept fully informed of events within his tribe by his headmen and sub-headmen, and is consequently in a position to promptly report outbreaks to the native commissioner. The same applies to the councils of headmen in other tribal areas.

The success of anti-plague measures is consequently very largely dependent on the co-operation and assistance of the chiefs and councils of headmen. Under existing conditions all the native commissioner can do is to try and keep them up to the mark. As this would entail considerable expenditure on travelling, various other alternatives were discussed with Mr. Hahn, but the conclusion ultimately arrived at is that constant and close personal touch with the chiefs and councils of headmen offered the only means of overcoming the difficulties, especially as the use of messengers is liable to lead to misunderstandings, evasions and loss of valuable time.

A special form for the notification of cases by missions and others has been drawn up in consultation with the native commissioner and district surgeon. The use of this form will ensure that complete details of patients and contacts are available in future.

(28) ANTI-PLAGUE MEASURES IN OVAMBOLAND.

Quarantine of Ovamboland.

Among the restrictions which were imposed after the outbreak of plague, only the quarantine of Ovamboland is still in operation.

Apart from servants accompanying their employers, there is very little movement of natives to the south at present. As a matter of fact, unemployed natives are being repatriated in considerable numbers from the south. In normal times, however, 500 or more recruited labourers are sent down to the mines each month. The boys are taken by motor lorry to Tsumeb and then by train to the diamond fields at Luderitz. The whole journey is said to occupy from four to six days. In addition considerable numbers go down on foot to visit relatives or to seek work.

At present every native is detained at Namutoni for three weeks before being allowed to proceed further, and, according to the Medical Officer to the Administration, it is proposed to maintain a quarantine depot at Namutoni. These restrictions appear to me to be unnecessary and likely to impose a very severe burden on industry.

To deal with mine boys alone in normal times would require a large quarantine depot of modern construction and with hospital and other facilities. It will be situated in heavily gerbille-infested country where rodent plague is endemic. If any cases of plague should occur among the boys, they may be held up for many weeks. On the other hand, natives proceeding on foot in search of work would have to be fed as it is impossible for them to carry a sufficient supply of food to last them during the period of detention and subsequent journey to Tsumeb. Further, they may become infected after leaving the depot.

I would recommend, therefore, that the quarantine be raised. The clothing of recruited boys proceeding to the mine compounds could be fumigated, should it be considered necessary, at Ondangua on the day of their departure. At Tsumeb, there is a mine hospital and Government native hospitals are situated at convenient intervals along the line, viz., at Omaruru, Windhoek and Keetmanshoop. It is an easy matter to make arrangements at these hospitals for the admission of boys taking ill on the way.

It should be borne in mind that rodent plague is also endemic in the occupied territory, so that the risk of infection is not confined to Ovamboland only.

Other Anti-plague Measures.

The measures which are considered of primary importance in dealing with actual outbreaks are systematic treatment of patients with anti-plague serum and inoculation of contacts with plague vaccine and particularly the disinfection of kraals.

With the assistance afforded by the Administration, it was possible to place these measures on a sound footing. Apart from certain difficulties in connection with transport, they were operating satisfactorily by the time I left Ondangua.

The strict isolation of patients is not practicable nor is it considered necessary, except in outbreaks of pneumonic plague, once complete disinfection of the kraal and the effects of its inmates has been carried out. The patients should, however, be confined to the kraal and not be allowed to move to relatives as is the custom among the Ovambo, especially when women take ill.

The natives in the affected kraals were invariably warned of the significance of the onset of cough with or without bloody expectoration, of the precautions to be taken when such symptoms appear and of the urgent necessity of immediately reporting their occurrence to the proper quarter. The necessity of immediately providing guards after the onset of pneumonic symptoms, *so as to prevent contact between the patient and the other inmates*, was also impressed upon the Native Commissioner. Under those circumstances, contacts should be strictly confined to the kraal, and burials should, if possible, be made under European supervision. After disinfection of the unit occupied by the patient the interior of the hut and the roof, placed upside down away from the hut, should be left exposed to the sun for a week or two. To attempt to destroy it by fire would result in the burning of the whole kraal and inflict unnecessary hardship, especially among the poor of the open plains.

As with patients, strict isolation of contacts is not practicable and need not be enforced, except in the case of pneumonic plague.

The establishment of a plague hospital is surrounded with many difficulties, apart from the expenditure which it would involve. It is accordingly not recommended.

To summarize, the procedure recommended is that the District Surgeon should visit the kraals from which cases are reported, satisfy himself as to the diagnosis and deal with patients and contacts. The Rodent Inspector, Mr. Schettler, should subsequently carry out disinfection as promptly as possible. It is advisable to provide the latter with a hypodermic outfit and vaccine for the inoculation of contacts as outbreaks may be brought to his notice in distant areas some time before the District Surgeon becomes available. In such cases he should proceed with disinfection without delay and inoculate the contacts, leaving the treatment of the patient to the District Surgeon.

(29) DISINFESTATION OF KRAALS.

Owing to the limited time at my disposal, it was not possible to go as fully as I should have liked into the question of the distribution of fleas in the kraal. The problem is further complicated by the fact that the methods employed in the disinfection of huts in the Union are not applicable generally to the various components of the Ovambo kraal.

The scarcity of wood and water in some areas and the loose sand, forming the floors of shelters and of some of the huts and various other places in which fleas may harbour, render the use of paraffin emulsion impracticable as very large quantities would be required. On the other hand, fumigation of all the huts and shelters would take up too much time and require a large staff if all the units are to be kept under close supervision during fumigation.

With a view to overcoming these difficulties as far as possible, experiments were carried out in order to determine whether requirements could be met by sprinkling the dust over the parts to be treated. An ordinary coffee or cocoa tin with small holes punched in the bottom was used for the purpose, and the dust was sprinkled in a very thin and just visible layer over the floors, over the interstices at the foot of the walls, inside and outside and, in the yards, over any spaces and corners which were not directly exposed to the action of sunlight. The effect on the flies alighting on the floor subsequently showed that the gas is given off immediately after exposure to the air, and that even in the open the concentration near the ground was sufficient to kill flies almost instantaneously.

When rodents are exposed to cyanogas, the fleas on them are killed before the animals themselves. A caged *T. schinzi*, placed on the floor immediately after the sprinkling, was killed in 90 seconds. Ten minutes later, another was killed in $2\frac{1}{2}$ minutes. The fleas on the animals were likewise killed. The gas, therefore, is given off in sufficient quantity and over a sufficient length of time to destroy the fleas on the surface and possibly, through absorption, also those in the sand. In order to ensure destruction of eggs, etc., the surface was gently raked over 5 minutes after sprinkling.

The procedure, which was finally adopted, was as follows:—

- (1) A survey of the kraal and its surroundings was made and burrows located.
- (2) Working from the centre outwards, all burrows in huts and partitions were gassed by pumping the dust into them.
- (3) Huts with stamped earth floors were treated according to circumstances either with paraffin emulsion followed by fumigation, or only by fumigation or the sprinkling of dust; those with sand floors and openshelters were treated by sprinkling only.
- (4) Sheltered spaces between huts and partitions or around burrows situated in the partitions and all dilapidated huts and their surroundings were dealt with by sprinkling.
- (5) The wearing apparel of the heathen is of a very scanty nature, is usually made of leather and not liable to harbour fleas to any extent. It was dealt with as circumstances seemed to require. The sleeping mats of skin were treated with paraffin emulsion and blankets, if any, in a similar manner or by fumigation. Among Christian natives, European clothes are usually worn and these, when new or in a clean and sound condition, were always fumigated.
- (6) Burrows in fences and the surroundings of the kraal were gassed by pumping the dust into them.
- (7) The dogs and cats were deverminized with petroleum emulsion.

Thorough ventilation after fumigation was obtained by lifting up one side of the roof, or by removing the latter altogether. It was controlled by placing caged rodents in the hut at intervals.

In every instance, the reasons for disinfecting the kraal were explained to the Kraal-head, and the necessity of keeping the kraal and its surroundings free from rodents was impressed upon all concerned.

With the procedure outlined above, it was found that 5 to 6 lb. of cyanodust were required for the average kraal.

Our work was handicapped by the want of canvass sheets for the fumigation of huts. It is essential that four pairs of light canvass sheets, each measuring 20 by 12 feet, be supplied to the rodent inspector for the purpose. He should also be provided with 3 protecting masks and accessories for use in connection with his work.

(30) PREVENTATIVE MEASURES IN OVAMBOLAND.

Among these are included educative propaganda through the medium of the officials and missions, and the destruction of kraal rodents by the people themselves.

The officials are carrying out an active campaign. The Native Commissioner is doing excellent work among chiefs and councils of headmen and similar work is being done by the district surgeon and rodent inspector among the rank and file.

The Missions in the Ondonga district and elsewhere are also doing a great deal towards enlightening the people. The distribution of the Department's pamphlets on plague would be of great assistance and serve as a guide to them in this work. Pamphlets, setting out shortly and simply in the Ovambo language the main features of the disease and the precautions to be taken, are required for distribution among schools.

Chiefs, headmen and the more intelligent among the people should be prevailed upon to set an example by inaugurating and continuing an anti-rodent campaign in and around their kraals. As the Ovambo youths are most expert at catching rodents, it should prove a very simple matter to keep the kraal and its surroundings free from them without the aid of poison or traps. The growth of grass and weeds around and along the outer palisade during the rainy season should be kept down as it affords shelter and harbourage for gerbilles and striped mice. Further, attention should be paid to the corn-baskets, and those resting on, or close to the ground should be raised well above it.

This aspect of the question has been discussed with the Native Commissioner who is keenly interested in the subject, and it is to be hoped that his efforts will meet with some response from the people.

(31) EDUCATIVE PROPAGANDA IN THE SETTLED TERRITORY.

In the settled portion of the territory, the co-operation of the Director of Education should be sought with a view to the dissemination of information on plague and current health problems among school children.

Among the general public in rural areas, addresses and practical demonstrations at the periodical meetings of farmers' associations, and on other public occasions, should go a long way towards placing the people in a position to help themselves. Detailed information as to the precautionary measures to be taken on farms is contained in the various publications of the Department.

In urban areas, every facility should be given to the local authorities for having men trained in anti-rodent work by the Rodent Inspector of the Administration.

In South West Africa, the problem facing the population is by no means as difficult as in the Orange Free State. The rodents mainly concerned in the spread of plague are easily killed and at very small cost by means of trapping, poisoned wheat or gassing of the burrows. It follows, therefore, that once the people are made to realize that outbreaks need not occur at all if they would only adopt precautionary measures, which are of a very simple nature and within the reach of all, plague should cease to be a menace in the territory.

(32) STUFFED SPECIMENS OF RODENTS REQUIRED FOR PROPAGANDA PURPOSES.

The Rodent Inspector should be provided with mouse and jackal traps as well as with the necessary instruments and materials for preparing and stuffing specimens of the species, which are mainly associated with the spread of plague, for propaganda work in schools and elsewhere. He should train his native staff in trapping and the preparation of specimens.

During my stay in Ovamboland sets were prepared for the district surgeon, the principal medical officer for southern Angola, the Finnish Mission, Dr. Nägelsbach of the O.M.E.G., and the Windhoek Museum. Mr. Schettler is thus acquainted with what is required.

(33) SCOPE FOR EXPERIMENTS WITH DE AAR DISEASE IN SOUTH WEST AFRICA.

The surface configuration and heavy infestation with *Taterona* gerbilles render certain localities, which are as yet free from rodent plague in South West Africa, peculiarly suitable for the conduct and control of experiments with De Aar Disease. If the results among *Taterona* should prove as promising as those among *Desmodillus* on the Sunday's River in 1930, it may enable us, as was indicated in the Annual Report of 1929, to anticipate and prevent, to some extent at least, the recrudescence and spread of rodent plague by means of artificial epizootics of De Aar disease. Any progress in this direction would be of inestimable value in the sandy portions of South West Africa in which, owing to the abundant, natural food supply, the rodents may possibly recover very quickly from an epizootic of plague.

(34) ADDITIONAL MEDICAL ASSISTANCE IN OVAMBOLAND.

Owing to the cessation of recruiting for the mines, the district surgeon is able to cope with the work at present. Any marked prevalence of plague may, however, call for the services of an additional doctor. In any case, it is essential that an additional district surgeon be appointed as soon as the mines re-start operations so as to enable the district surgeon to devote all his time to plague and other duties.

(35) APPOINTMENT OF RODENT INSPECTOR.

The permanent employment of a rodent inspector by the Administration is essential. If any undue prevalence of plague should occur in Ovamboland, or in the event of concurrent outbreaks in other parts of the territory, the services of an additional inspector will be required. To provide for this contingency, it is recommended that a suitable man be selected for training by the present inspector, Mr. Schettler. This is a matter of urgency as outbreaks may be expected shortly both in the Ukuanyama and north-western districts which are too far distant from each other to be handled efficiently by one inspector under such circumstances.

The matter of transport for the rodent inspector was still under consideration at the time of my departure. It is very necessary that he should be as mobile as possible and independent of the movements of other officials.

A staff of at least 3 boys is required by Mr. Schettler in Ovamboland if the work is to be carried out in an expeditious and efficient manner.

Half a dozen Cyanodust pumps should be provided for use in Ovamboland.

During the off-season in Ovamboland, Mr. Schettler should be required to make a survey of the conditions obtaining in the rural and urban areas of the territory and to assist in organizing anti-rodent measures among farmers and urban communities, more especially at the Ports. He should be required to keep the Administration informed on such matters as the extent and direction of spread of the epizootic, the areas threatened by a recrudescence of rodent plague, the conditions likely to precipitate outbreaks on farms, the anti-rodent measures, including the rat-proofing of buildings, adopted by local authorities, the prevalence of rats at the Ports and kindred matters. Useful and very necessary information about the species of fleas infesting the wild and other rodents and their seasonal prevalence could be collected at the same time.

(36) ANTI-RODENT WORK ON THE SOUTH WEST AFRICAN RAILWAYS.

While at Windhoek, I called on the system manager but, as he was absent from headquarters, I was referred to Mr. Coetzee. The latter kindly arranged for Mr. Louw, the Railway ratcatcher, to meet me at Kalkfontein and accompany me as far as Upington.

I am indebted to Mr. Louw for the following information:—

The methods employed by him consist of trapping in sheds and station buildings, and the use of mole and vermin cartridges and occasionally of carbon bisulphide for gassing the burrows of meercats and gerbilles.

The anti-rodent work is not confined to stations and sidings only, but is carried out also by gangers wherever meercats or rodents appear to be plentiful along the line. House mice are numerous in dwellings and sheds everywhere along the line. Except in the coast towns, rats are very seldom caught or seen.

Mr. Louw's section extends from, but excludes, De Aar to Tsumeb, and includes 27 stations with goods sheds. It is covered systematically once every quarter.

The anti-rodent measures should be confined to the ports and to stations and sidings. The destruction of rodents on the line between stations is sheer waste of time and money. The methods employed require overhauling. Disinfestation could be carried out very much more expeditiously, thoroughly and economically by the use of cyanodust and the trapping methods could be improved very considerably.

To place the work on a sound footing, it is recommended that Mr. Louw be sent to be trained by Mr. Swanepoel, Chief Railway Ratcatcher in the Orange Free State, in the present-day methods of rodent destruction. It is also desirable to co-ordinate the anti-rodent work of the Administration, the railways, and the local authorities along the line.

(37) REGULATIONS RELATING TO PLAGUE.

The Union regulations relating to plague and the rat-proofing of buildings, with certain minor amendments to meet local circumstances, are in force in the territory. Their strict enforcement in Ovamboland is not practicable. The question of imposing the penalties, provided for in the regulations, on tribal authorities who persistently fail to report outbreaks or to co-operate with the Native Commissioner in other respects, should receive consideration.

(38) CONCLUSIONS.

- (1) The outbreaks among the Ovambo are due to plague.
- (2) Infection was caused by the spread of an epizootic of rodent plague from the Union northwards through the Kalahari.
- (3) The epizootic is still active in Ovamboland and other parts of South West Africa, and would appear to be characterized by a primary wave of infection spreading with considerable rapidity along the main dunes and their off-shoots, and a secondary and more gradual spread from the dunes on to the plains.
- (4) The same species of rodents are responsible for the spread of the epizootic as in the Union.
- (5) As in the Union, the multimammate mouse is the most important intermediary between rodent and man.
- (6) The outbreaks were invariably associated with a concurrent mortality among kraal rodents.
- (7) While the associated mortality among kraal rodents rendered it difficult to determine the place of infection in human cases, the available evidence points to the kraal itself as the most important source of infection. No evidence was obtained of infection having taken place in the veld. The possibility of infection through the digging up and eating of rodents cannot, however, be entirely eliminated.
- (8) To prevent the spread of the disease in an affected kraal or from kraal to kraal, early and prompt notification of outbreaks is essential.
- (9) The conditions which may be the determining factors of outbreaks on farms in rural areas are not known and require investigation.
- (10) Further research is required to determine the species of fleas infesting rodents, their distribution, seasonal prevalence, etc.

(39) RECOMMENDATIONS.

The following is a brief summary of the main recommendations contained in this report :—

- (1) Steps should be taken to secure prompt notification of outbreaks among the heathen as well as among Christians.
- (2) An additional district surgeon should be appointed in the event of any undue prevalence of plague in Ovamboland or, in any case, on the resumption of mining operations.
- (3) The position in South West Africa calls for the permanent employment of a trained rodent inspector. To provide for future contingencies, a suitable man should be selected for training by the present rodent inspector. Separate motor transport should be provided for the latter.
- (4) The district surgeon should investigate, if possible, all new outbreaks, treat the patients and inoculate all contacts. A supply of serum and vaccine should be constantly available for the purpose.
- (5) The disinfestation of all infected kraals should be carried out as promptly as possible after notification and in the manner described.
- (6) Attention should be given to European premises in Ovamboland with a view to eliminating harbourage for rodents.
- (7) An anti-plague organization should be set on foot in the territory. Educative propaganda through officials, schools, missions, etc., should be given prominent place in the anti-plague campaign, both in Ovamboland and over the rest of the territory.
- (8) The anti-rodent measures of the Railway Administration should be overhauled and brought up to date, and should be concentrated on

the port areas, railway stations and sidings and other premises for which the railways may be responsible. Attention should be directed to the rodent-proofing of buildings, particularly in the coastal area, and anti-rodent work should be co-ordinated with that of the South West Africa Administration and of local authorities.

- (9) The owners or occupiers of property abutting on railway ground should be required to co-operate with the Railway Administration by keeping their premises free from rodents.
- (10) During the off-season, the rodent inspector should be employed as recommended under paragraph (35) of this report. He should be required to submit a special report on the anti-rodent work, including the enforcement of the rat-proofing regulations, in urban areas.
- (11) Investigation into the practical application of artificial epizootics of De Aar disease among *Taterona* gerbilles in South West Africa is recommended for consideration.
- (12) Though a great deal has been done by the Administration towards the protection of the natural enemies of rodents, the question of protecting species, which may still be excluded from the list, is recommended for consideration.

In conclusion, I desire to express my thanks for the facilities which were placed at my disposal by His Honour the Administrator, Mr. A. J. Werth, and by the Secretary for South West Africa, Mr. H. P. Smit. Free use has been made of the information contained in Hahn's article on the Ovambo in the volume on "The Native Tribes of South West Africa", which was published by the Administration. To Mr. and Mrs. Hahn, I am most grateful for their great kindness and generous hospitality in Ovambo-land. I am also deeply indebted to Mr. Hahn for valuable advice and assistance during the course of my investigations. Special thanks are due to Dr. Van Niekerk for his cordial co-operation and assistance and to Messrs. Thomson and Schettler for helping in such a willing manner at all times.

I likewise wish to express my cordial thanks for the assistance which I received from Dr. Rainio and the members of the Finnish Mission and from Mr. Zelle, the meteorological officer at Windhoek.

L. FOURIE,

Assistant Health Officer.

Durban, 8th June, 1932.

ANNEXURE B.

TABLE 1.—PUBLIC VACCINATIONS DURING THE YEAR ENDED 30TH JUNE, 1932.

Province.	Number of Centres at which Public Vaccinations were held.		Number of Visits of Public Vaccinators to Centres.		Numbers Vaccinated.						Total.
	Urban.	Rural.	Urban.	Rural.	Europeans.		Non-Europeans.				
					Primary.	Re-Vaccination.	Primary.	Re-Vaccination.			
Cape.....	195	1,533	1,200	1,626	12,289	913	96,909	37,623		147,734	
Transvaal.....	93	488	1,960	516	12,722	1,601	64,679	114,143		193,145	
Natal.....	48	249	326	272	1,099	761	19,554	1,247		22,661	
Orange Free State.....	59	232	943	238	5,376	124	12,130	347		17,977	
TOTAL.....	395	2,502	4,429	2,652	31,486	3,399	193,272	153,360		381,517	

ANNEXURE B—(Continued).

TABLE 2.—VACCINATION OF INFANTS AND CHILDREN IN THE CLASSES OF THE POPULATION WHICH REGISTER BIRTHS, YEAR ENDED 30TH JUNE, 1932.
(THESE FIGURES DO NOT INCLUDE RE-VACCINATION OF 12-YEAR-OLD CHILDREN.)

Particulars.	Cape.		Transvaal.		Natal.			Orange Free State.	Union.
	Cape District.	Remainder of Province.	Rand Area.	Remainder of Province.	Durban.	Pietermaritzburg.	Remainder of Province.		
Births Entered in Vaccination Register.....	12,385	33,676	9,133	11,022	2,038	567	1,622	4,954	75,397
Successfully Vaccinated.....	6,621	2,935	2,513	4,281	957	461	917	4,388	23,073
Insusceptible to Vaccination.....	2	—	96	62	32	10	12	50	264
Vaccination Postponed owing to Illness.....	421	175	226	276	302	94	332	876	2,702
Previously had Smallpox.....	7	—	—	—	—	—	—	1	8
Deaths of Infants under Two Years Registered.....	2,931	2,865	723	594	166	29	123	252	7,683
Exempted under Section 10, Act 15 of 1928.....	33	63	92	83	162	23	47	50	553
Ratio Percentage of Vaccinations Registered to Births Registered during the Year (after allowing for deaths of infants under two years).....	70·0	9·5	29·9	41·1	51·1	85·7	61·2	93·3	34·1

ANNEXURE B—(Continued).

TABLE 3.—RE-VACCINATION OF TWELVE-YEAR-OLD EUROPEAN CHILDREN IN NATAL, YEAR ENDED 30TH JUNE, 1932.

Particulars.	Durban.	Pieter-maritzburg.	Remainder of Province.	Total.
Registration of twelve-year-old European children.....	1,316	438	1,237	2,991
Successfully vaccinated.....	579	314	727	1,620
Insusceptible to vaccination.....	45	32	95	172
Vaccination postponed owing to illness....	24	7	46	77
Previously had smallpox.....	—	—	—	—
Ratio percentage of vaccinations to twelve-year-old registrations.....	49·24	80·59	70·17	62·49

